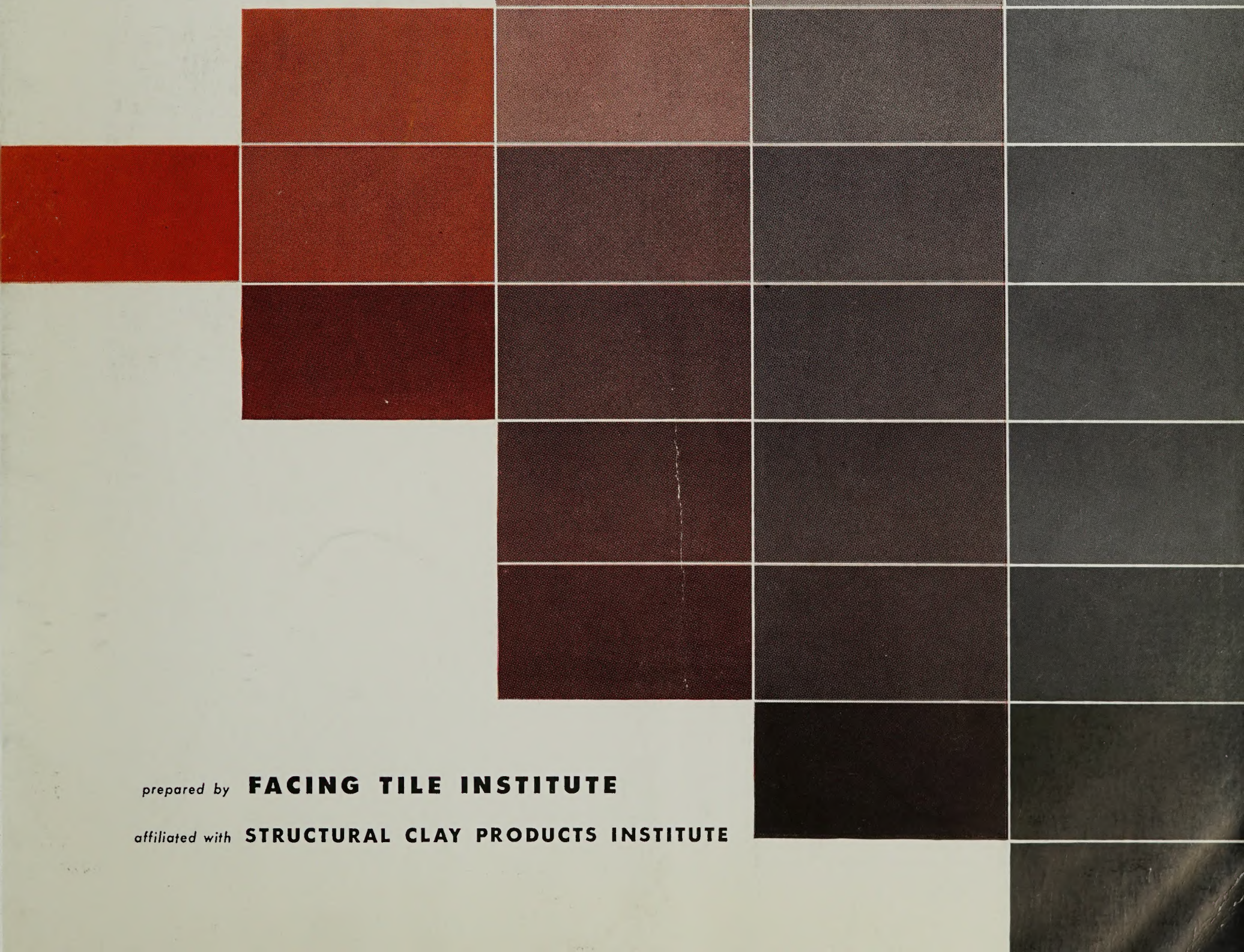




COLOR-ENGINEERED FACING TILE

the scientific approach to color specification



prepared by **FACING TILE INSTITUTE**

affiliated with **STRUCTURAL CLAY PRODUCTS INSTITUTE**



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the scientific approach to color specification

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THE FACING TILE INSTITUTE

affiliated with

STRUCTURAL CLAY PRODUCTS INSTITUTE

1520 18th Street, N. W., Washington 6, D. C.

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FABER BIRREN: As color consultant to the Facing Tile Institute, Faber Birren has designed this book to be of service to architects, designers, engineers, contractors and building owners. He is recognized as an outstanding authority on the functional and psychological aspects of color, has written some fourteen books and three hundred articles, and has worked extensively in the scientific application of color to industries, schools, hospitals, public buildings, stores and commercial establishments. Birren's work is well regarded by the medical profession and his writings have been published in leading medical journals*. Although he is professionally eminent in his field, he is particularly well qualified because of a rich and varied practical experience. His principles of color will be found in important buildings throughout America.

* If you are interested in the scientific aspects of color, write to the Facing Tile Institute, 1520 18th Street, N. W., Washington 6, D. C., for a copy of one of Faber Birren's more technical articles; "The Ophthalmic Aspects of Illumination, Brightness and Color", *Transactions, American Academy of Ophthalmology and Otolaryngology*, May-June, 1948.

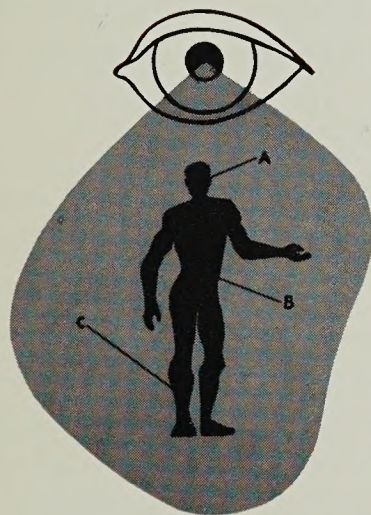
NOT BEAUTY ALONE . . .

BUT FUNCTION, PURPOSE,
HUMAN EFFICIENCY . . .

Not too many years ago the specification of color in facing tile—and many other building products—was largely decided through personal opinion. Color was left to the care of artists and designers trained to express “good taste.”

While such an approach is still desirable and necessary in many architectural projects such as homes, today a new science has been developed for those applications of color in which definite needs and problems are to be met. In industrial plants, for example, good visibility, relief from eyestrain and fatigue are essential. In hospitals, convalescence is to be served. In schools there are requirements of sanitation, of healthful seeing conditions that will safeguard child welfare. Commercial establishments may need hues adjusted to the emotional preferences of the public at large.

what are engineered colors?



The color standards of the Facing Tile Institute (shown in the center spread of this book) have been checked through research (a) for good appearance and (b) for technically right degree of hue and brightness. The first is important to assure widespread appeal, the second to meet the requirements set forth by ophthalmologists, seeing authorities and lighting engineers.

Where the use of facing tile involves working conditions and operations in which perfect seeing is vital, the specification of color should follow recognized scientific method. The engineering approach to color had its beginning in the hospital field over two decades ago. At that time studies were made of glare and fatigue in an effort to aid the skill of the surgeon. Glaring white was replaced by soft tones of Light Green and Ocular Green (corresponding to existing facing tile standards) which removed high brightness from the field of view, made concentration easier, and relaxed retinal nerves by complementing the red hue of human tissue.

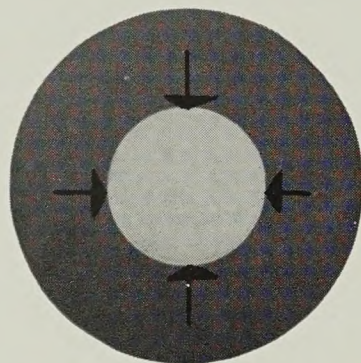
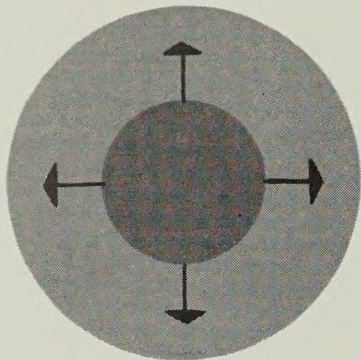
The principles of functional color were then extended to other areas of the hospital, to schools and eventually to factories and industrial plants.

the causes and results of eyestrain

The need for engineered color has been brought about by a number of factors. Technical advancements in illumination have made high levels of light economically possible. And with more light has come a need for the proper distribution and control of it. Better labor relations have demanded better environments, the more extensive use of a durable product such as structural clay facing tile. A multitude of critical seeing tasks have placed new burdens on human eyes. American plant facilities have improved and have merited the advantages offered by color.

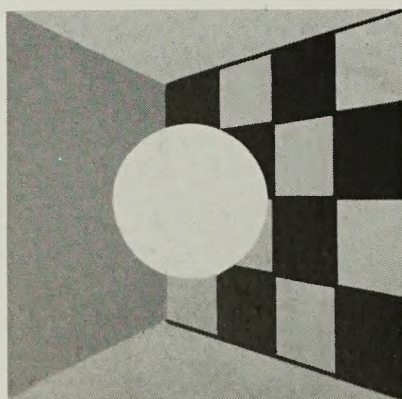
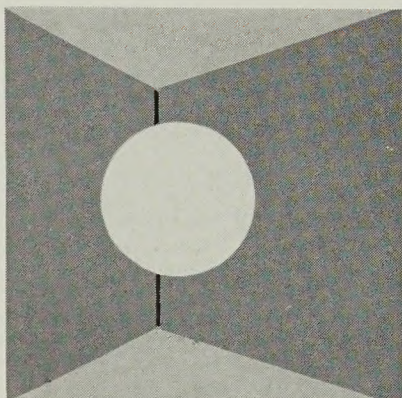
Seeing is handicapped where there is glare, excessive contrast in the field of view, continual pupillary adjustments to light and dark, prolonged convergence of the eyes, lack of convenient and suitable areas for visual relaxation. These irritations may cause a number of bad reactions which

reactions to light and color



Human attentions will be attracted to brightness as against darkness in color.

brightness engineering



Proper control of brightness is essential to good vision.

the medical specialist is able to measure with instruments. There may be increased rate of blinking, severe dilation of the pupil of the eye, reduced sensitivity on the outer boundaries of vision, greater muscular tension and fatigue—and general irritability and nausea.

The actions of light and color are easily explained. Brightness is stimulating; darkness and softness are subduing. Further, warm colors have an exciting effect, while cool colors are retiring and passive.

Through research science has been able to establish many unusual facts about color. Reactions to light are often involuntary. Sudden brightness or motion may cause the head to dodge, the muscles to grow taut. Brightness and warmth of color stimulate the human systems: blood pressure, pulse and respiration rate tend to rise. Dimness and coolness of color release tension: blood pressure, pulse and respiration rate tend to be lowered.

From such evidence as this, functions for color are easily prescribed. The human body will struggle to orient itself to light. As energy of stimulation goes up, response goes right along with it. *Tasks requiring much physical exertion may be best performed in a fairly bright and intense setting of warm and sunny colors.*

However, where extremely fine and critical tasks are to be undertaken (or where complex mental problems are to be solved) the bright environment may be unduly distracting and needlessly exciting. Here the colors chosen may be cooler in hue and softer in tone. Supplementary light may, if desired, be directed immediately and locally over the task. *Difficult visual tasks are best performed in a subdued setting of neutral or cool colors.*

Numerous case histories and clinical studies have proved that, regardless of color, all areas in the field of view should be as uniform in brightness as possible. If in looking about an interior the eye must alternately adjust itself to high brightness and then to low brightness, tiresome muscular actions to regulate the pupil opening of the eye may result. The situation will be particularly unfavorable if the task is dark (i.e., dark machinery) and the surrounding walls exceedingly light—for the eye will be quick in adjusting itself to the walls and slow in adjusting itself to the job. Obviously, the order of emphasis will be precisely wrong!

White, therefore, may be unwanted because of glare. However, white or pale tones may be suitable where critical seeing tasks are not performed—corridors, stairways, operations having automatic machinery, places where the ultimate in cleanliness is imperative. The softer and slightly deeper color is preferable for any interior where seeing must be at its efficient best.

Where it is impractical to raise the brightness of existing surfaces such as wood block floors, dark colored machinery, the subdued color in facing tile becomes almost imperative in order to lessen contrasts. Ceilings, however, may nearly always be white for high light reflection inasmuch as they usually lie outside the direct field of view.

ideal color specifications

The pages and illustrations that follow contain numerous suggestions and recommendations for the scientific choice of color. Here are a few simple conclusions and principles.

- 1 Hold all areas, surfaces, equipment, machinery as uniform in brightness as possible. Keep ratios within 10 to 1 at least, and within 5 to 1 if at all possible. (To explain, if walls are white and reflect 85% of light, and if floors are black and reflect only 2%, the ratio—under uniform illumination—would be an unfavorable $42\frac{1}{2}$ to 1.) The standards of the Facing Tile Institute have been technically fixed to meet special as well as average requirements.
- 2 Under nearly all conditions ceilings should be white for good light distribution. In non-working areas, facing tile on walls may reflect 60% or over.
- 3 Where critical seeing tasks are performed, however, wall reflections between 40 and 60% are ideal. Work demanding extreme visual and mental concentration may take wall reflectances between 30 and 40%. (Facing Tile Standard Ocular Green is recommended for hospital operating rooms.)
- 4 Where interiors may be vault-like, cool, barren, the warm tint may be preferable (Facing Tile Ivory, Sunlight Yellow, Coral, Tan, Cream Mottle, Clear Glaze, Salt Glaze).
- 5 Where temperatures or operations may involve exposure to heat, cool tints may be preferred (Facing Tile Light Gray, Light Green, Ocular Green, Blue, Gray Mottle, Green Mottle).
- 6 Keep in mind that brightness and warmth may be best for heavy physical tasks; coolness and modification of tone may be best for visual tasks. Where freedom from distraction is wanted, gray may be the most suitable tile color of all.

cash profits and human values

Color engineering with facing tile is a sound investment from many standpoints. The permanence of the product itself will obviate the need for costly refinishing throughout the years. Capitalization of the scientific control of color and brightness will lead to improved production, better workmanship, relief from eyestrain and fatigue, reduced accident hazards, finer morale and industrial relations, higher standards of housekeeping and maintenance.

In cash, the values of color are not too easy to determine. Yet from competent studies made by industries throughout America, by agencies such as the U. S. Public Health Service, the scientifically right environment is worth fully \$100.00 or more a year per employee in better production and savings on payroll—against the drab and inadequate condition of the past.

Color holds universal appeal. To give it these added values of function and purpose is to show an expected progress in the generally advanced status of American industry.

THE RIGHT PRODUCT,

THE RIGHT COLOR, TO ANSWER
SPECIAL NEEDS AND PROBLEMS

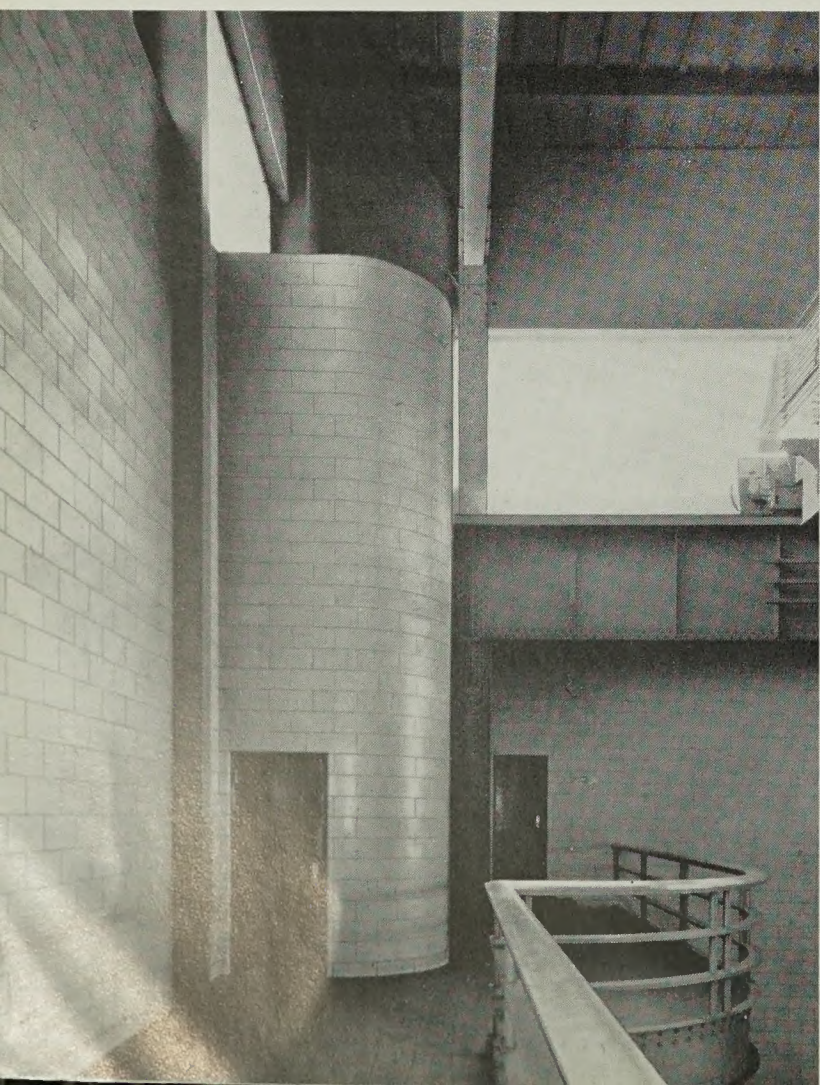
Structural clay facing tile is a practical and functional product in many ways. It is structurally sound and permanent. The color standards established for it are also functional and meant to serve useful ends.

In the pages that follow, useful help and advice are extended on the right specification of color. The suggestions made are both scientific and reliable—for they have been developed out of research and the analysis of a multitude of actual case histories. From the files of the organization of Faber Birren as well as from projects served by all members of the Facing Tile Institute, a wealth of data has been assembled. Successful practice in the use of colored facing tile has been checked against the recommendations of specialists in human vision and illumination.

This type of inter-industry cooperation is unique in the building material field. Obviously where real purposes are to be served, there are good and bad applications for color. More than this, specific answers may be reached as to exact color shade and tone which virtually eliminate the uncertainty of temperamental choice. There are ideally correct variations of ivory, yellow, buff, coral, tan, gray, green, blue, which excel all others from the technical standpoint, and these are the recommended standards of the Institute!

THE MODERN INDUSTRIAL PLANT

Structural clay facing tile has a stately clarity.
The color is permanent and easy to maintain.

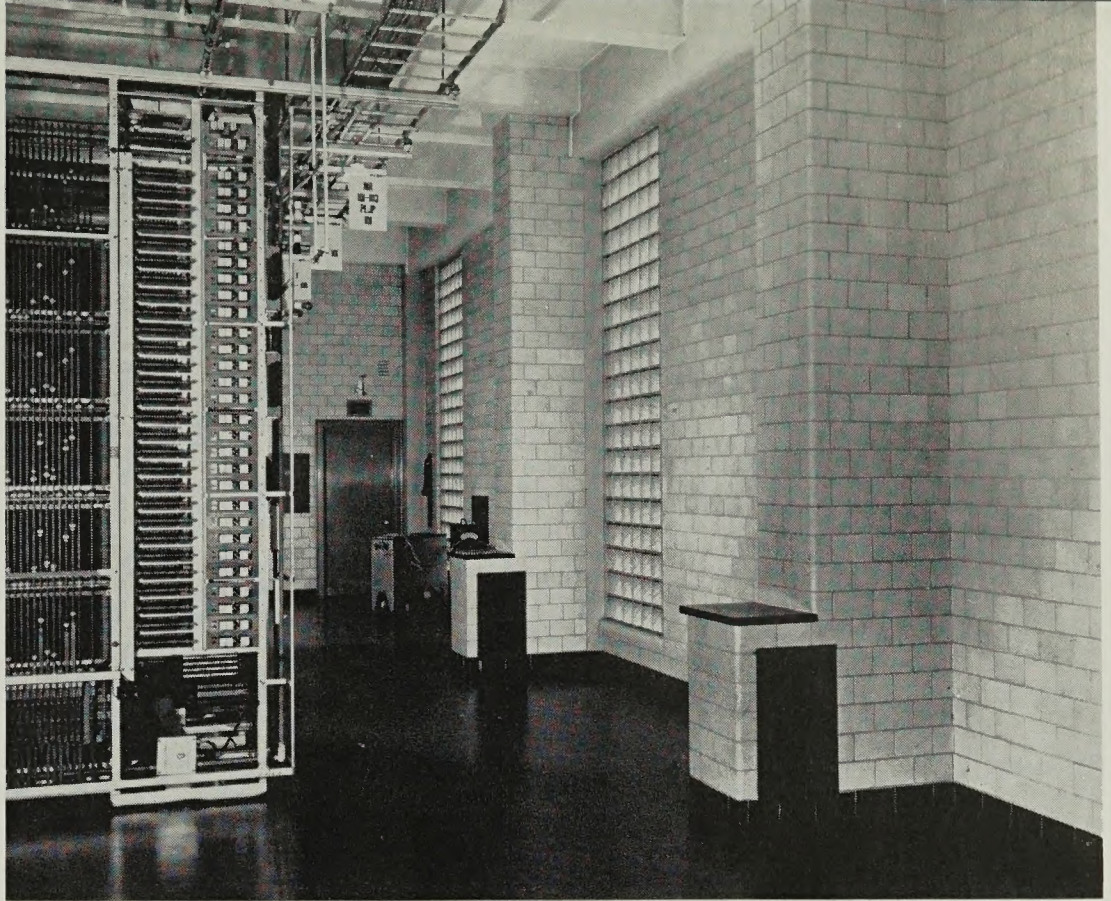


While good appearance is desirable in industrial interiors, function and purpose should override beauty. After all, color may be distracting if it is used too freely and too intensely. Human efficiency is at its best and seeing is most comfortable when the environment fails to draw attention from the tasks at hand. This is accomplished with relatively subdued color tones, lack of severe contrasts, walls that are neither too bright nor too dim but which make the visual process a smooth and easy one.

Whereas orientation—room exposure—is frequently considered in the selection of colors for homes, in industry the preferred strategy is to let the color be dictated by the operations performed. Where this is done, the plant will be scientifically right and color will pay vital dividends in better workmanship and the conservation of human energy.

Large spaces in which the work locations may be more or less removed from walls may take light colors with little danger of glare. Here a bright and cheerful effect may be secured, and natural and artificial light sources will be given maximum reflection and diffusion. Where such spaces may be vaulty in aspect, where the climate of the region may be predominantly cool, Facing Tile Ivory, Sunlight Yellow, Coral, Cream Mottle, Clear Glaze and Salt Glaze may be specified. Sunlight Yellow will be particularly right if the plant is deprived of good natural light.

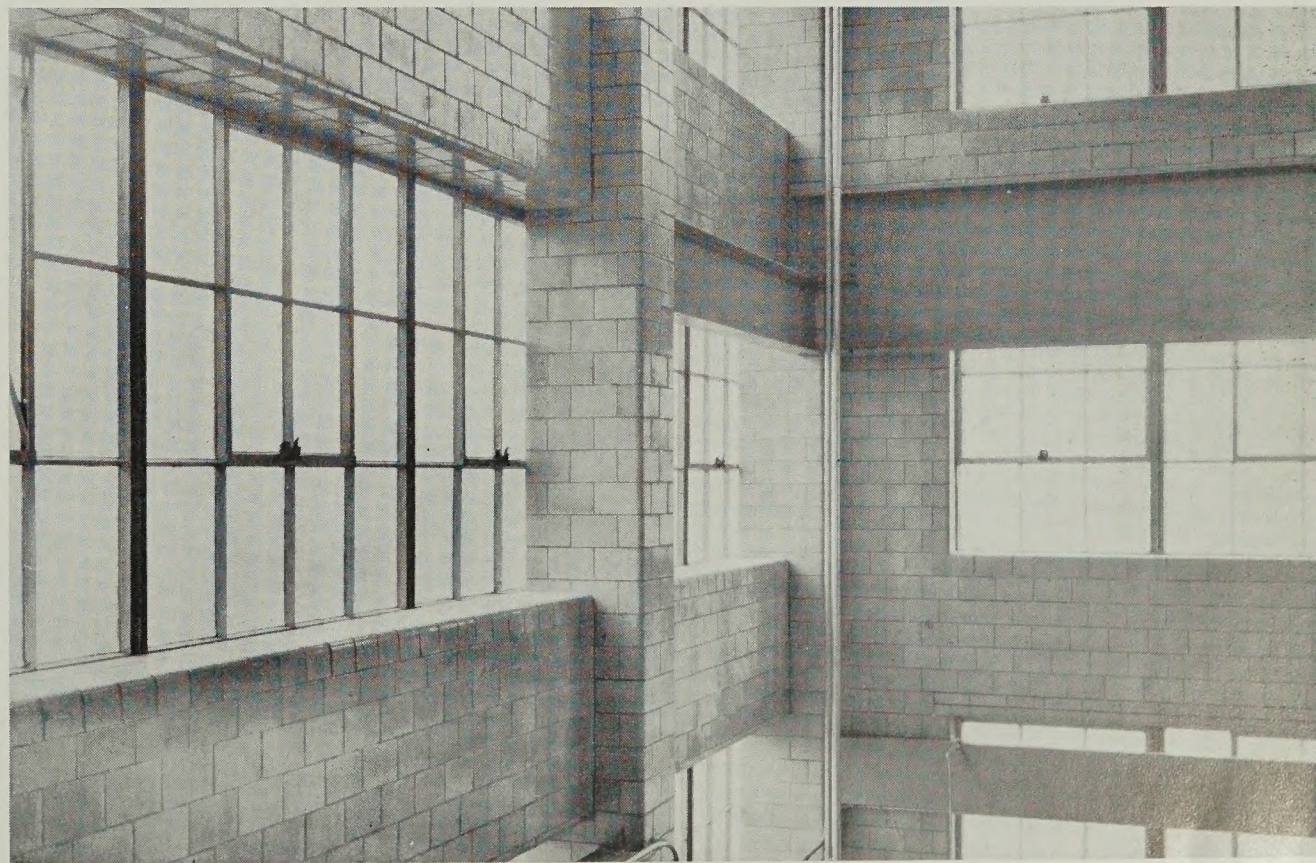
Where delicate tasks are performed, such as in a telephone exchange, colors of medium tone, Light Gray, Light Green, Gray Mottle, Green Mottle, strike a happy balance in brightness to relieve eye-strain. These colors apply also to machine shops, parts assembly, tool making and the like. If the tasks are on the difficult side visually, Light Gray, Mottle Gray or Ocular Green may be best of all.



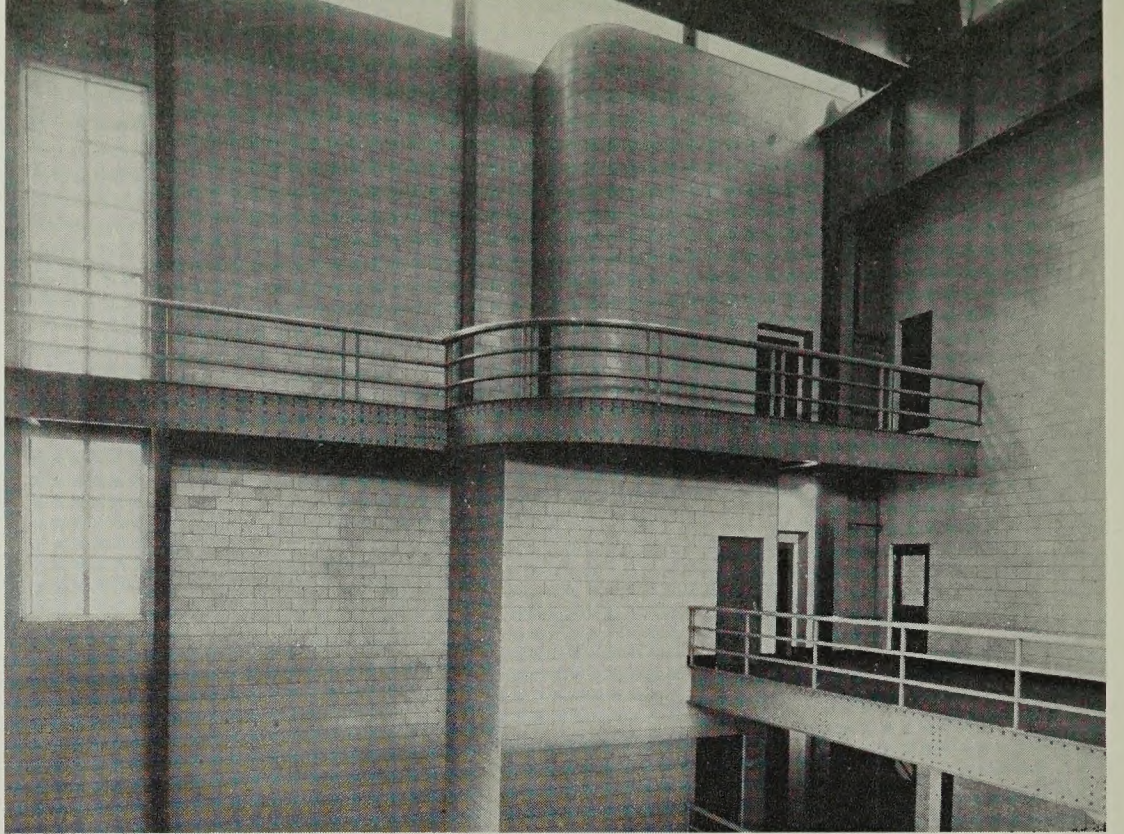
As often, where the manufacturing process exposes the worker to high temperatures, the color choice may include Light Green or Green Mottle. If there is extensive fenestration, Light Gray may provide a needed relief from glare. Blue, however, is not recommended for large working areas.

In special departments having smaller areas, other principles may best apply. If the worker is engaged in difficult seeing tasks, wall glare should be avoided. Here excellent colors will be found in Facing Tile Light Gray, Light Green, Ocular Green (for extremely critical tasks), Gray Mottle and Green Mottle. Mottled tile has an interesting texture and lack of monotony when seen fairly close. Coral may also be acceptable if there is need to compensate for low temperatures and "chilly" atmosphere.

Facing tile is a versatile product which simplifies construction by the combined advantage of load-bearing strength and permanence of colored surface.



There is structural beauty as well as strength and durability in facing tile over large areas.



Where color follows function, variety becomes automatic and will help to assure an interesting "change of pace." Washrooms for men, for example, may be Blue, Light Green or Green Mottle. Washrooms for women may be Coral. Again, Sunlight Yellow may be wanted for dark locations.

Cafeterias are perhaps best in Coral which has an "appetizing" and warm tone. Corridors and stairwells, if without much natural light, may be Ivory, Sunlight Yellow, Cream Mottle, Clear Glaze or Salt Glaze. Normally "smoky" departments, foundries, forge shops, heat treating and the like are practical in Clear Glaze and Salt Glaze. A finish such as white is not endorsed by seeing authorities for areas in which many workers are concentrated—except, possibly, where difficult eye problems are not encountered or where absolute cleanliness is imperative.

As a matter of modern practice base course and box cap mold should match walls and wainscoting. Dark stripes or courses may be needlessly distracting. Tile may be laid with conventional running bond or, as some prefer, in vertical rows or stack bond.



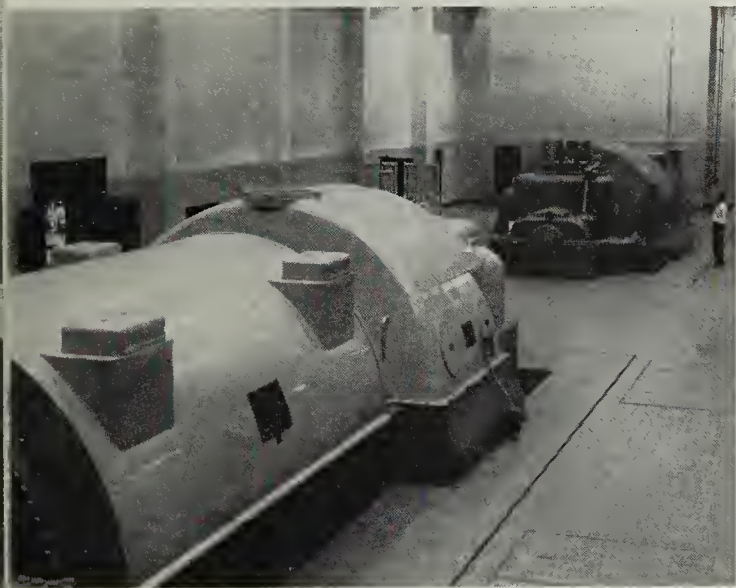
Corridors and stairwells seem best specified in pale light tones to reflect abundant light.

Working areas seem best specified in softer greens, grays and coral tones to reduce glare.



POWER PLANTS

The trend toward lighter colors in large machinery is attractively complemented by bright hues in facing tile. A spic and span plant, easy to maintain, is made possible.



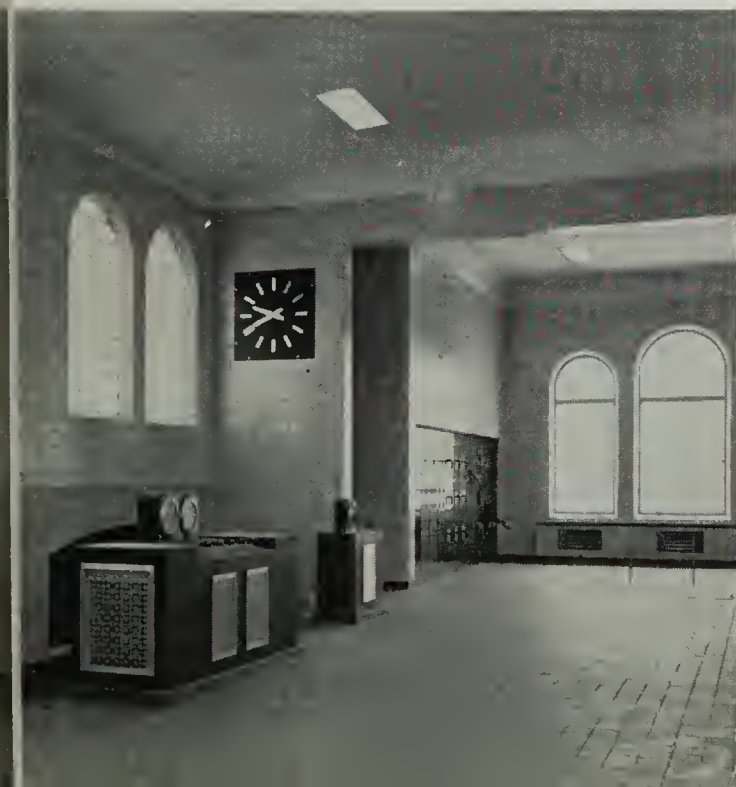
The white tile power plant and engine room of the past are still in good tradition. Recently, however, other tones have been applied, notably Light Gray and Gray Mottle. Constant emphasis by authorities on vision and illumination of the problems of glare has led to the introduction of more subdued colors. While critical seeing tasks may not be performed in power plants, large wall expanses are frequently encountered. With a trend toward lighter finishes on machinery and equipment, the softer wall tone meets the requirement of good scientific practice in brightness engineering and the reduction of contrasts.

While gray is serviceable and practical, other colors are also to be considered. Where illumination may be dim, Sunlight Yellow, Ivory, Cream Mottle, Clear Glaze and Salt Glaze are appropriate. Where there may be high temperatures, psychological compensation may be found in Light Green and Green Mottle.

For wainscot effects, thought may be given to Ocular Green with Light Green, Tan with Ivory, Light Gray with Sunlight Yellow, Gray Mottle with White Mottle, Buff Tone Salt Glaze with Cream Tone Salt Glaze.

Whatever the choice, clay facing tile is the ideal product for the power plant—permanent, economically maintained and suitable for the high standards of plant housekeeping usually found in these departments.

Structural clay has the right physical qualities for durability and the right visual qualities for good seeing.



Where walls, ceilings and floors are held light in tone two advantages are gained; the best of housekeeping is facilitated; absence of contrast eliminates visual fatigue and assures human efficiency and comfort.

CHEMICAL INDUSTRIES



Laboratory work is difficult and confining. Very pale colors should be avoided both to eliminate the distraction of glare and to hold the adjustment of the eye to a uniform and comfortable level.

The eye is stimulated by warm colors and relaxed by cool ones. Where the operation may require workers to stand in fixed positions, green and blue may be the right choice. On the other hand, large, vaulted spaces may be given a more friendly and cheerful aspect with warm tones such as ivory, yellow, coral, cream. Attractive appearance will take care of itself when functions are served.

Because facing tile is easily cleaned it will instill the best of tidiness and care which are so essential to accurate work.

Many chemical and processing operations are wholly or partly automatic. Color may not involve good visibility as much as it does good appearance. Ceramic glazed facing tile is inherently impervious to liquids, and color choice may be fairly optional.

While there is little fault to find with the "spic and span" qualities of white, for more interest and variety and to add comfort and pleasure to the working environment, color holds real magic. Also it will relieve glare in the reading of gauges and instruments.

Light Gray and Gray Mottle are highly favored. Yet to carry out sound principles of brightness engineering and color conditioning, colors such as Ivory, Sunlight Yellow, Coral, Cream Mottle, Clear Glaze and Salt Glaze may be used where room temperatures are normally cool, while Light Green and Green Mottle may be used to offset the discomfort of high temperatures.

If manufacturing areas are carried out in one uniform hue, it is best to specify other colors in laboratories, wash rooms, corridors, stairwells—again on a functional basis where possible. Light Gray and Gray Mottle, for example, are ideal laboratory hues because they lack distraction. Employee facilities are preferred in brighter hues to offset monotony.



DAIRY — PACKING

Where cleanliness is required, light facing tile colors should be used for walls, partitions and cove base.

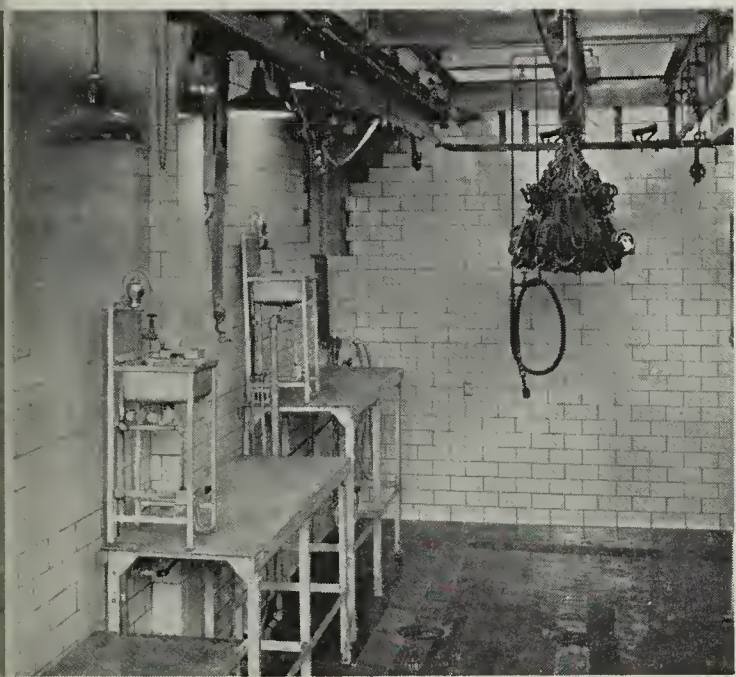


The ultimate in cleanliness and sanitation is assured by facing tile. The product being right in quality, there remains the problem of right color selection.

In dairy industries, bright colors such as White, Ivory, Sunlight Yellow, White Mottle, Cream Mottle, Clear Glaze, Salt Glaze will encourage good housekeeping. Dark colors obviously hide dirt. Normally a warm tint is preferred to a cool one because of average low temperatures brought about both by a minimum of heating units and by refrigerated areas.

The pale tint is efficient in light reflection and it directs brightness into dark spots and cracks. This not only discourages careless habits, but it makes maintenance easier.

In meat packing there may be more detailed operations, more departments and more employees. Here where numerous tasks are performed, subdued colors such as Light Green, Tan, Green Mottle may be superior. Ocular Green, which complements the red tint of meat, may be wholly functional and may actually increase productivity. However, the cool tone may be wanted for rooms having normal temperature, with warm tones applied to refrigerated spaces.



Food handling and processing demand the clean and sterile conditions made possible by facing tile.

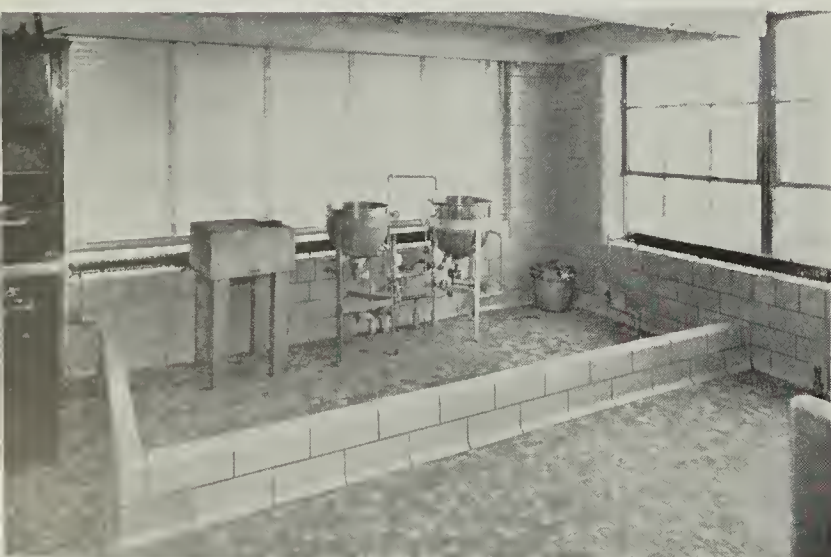
Over large areas light colors may be used with little danger of glare. They will add efficiency to natural and artificial light sources and help to eliminate dark corners and shadows.



FOOD PROCESSING



Some food processing plants use Light Green or Green Mottle where the room temperature is comfortable. Where the room is refrigerated, a color such as Coral is hard to surpass.



Bright colors in structural clay facing tile are spacious, clean, bright, and they encourage clean habits.

Rules and regulations in the specification of color need a fairly broad latitude. With uniform brightness well controlled, color choice itself may be rather liberally approached.

Yet in food industries, color associations are to be respected. Some hues seem appetizing while others do not. If a reasonable basis is to guide the selection of color, then it should be preferred over vague emotional preferences. It is usually possible to find good hues for definite operations. There may be purposes to serve, and a bit of deliberation may lead to highly satisfactory results.

In food processing there are varied operations. Meat products may be complemented in hue with Light Green, Ocular Green, Blue or Green Mottle. Fresh vegetables may be complemented with Coral, Tan, Cream Mottle, Clear Glaze. While gray is not an objectionable color in food processing, it is not very "savory" in aspect and thus will not hold the best of appeal to employees, a good percentage of whom are often women.

The factor of average room temperature may also be regarded—with cool hues reserved for heated spaces and warm hues for refrigerated rooms. It is always appropriate to let color choice follow reason and purpose rather than mere personal or "artistic" feeling.



Food products and beverages suggest color and perhaps need color-engineered facing tile to appear their best.

FOOD SERVICE

Windowless interiors may be given a "sunny" appearance with luminous colors: Sunlight Yellow, Coral, Ivory.



Coral is ideal for the cafeteria or dining room, with Blue back of food service counters.



Moisture is readily controlled through the use of facing tile. Areas may be washed and hosed at will.



For many years structural clay facing tile has won its case in food service. It is found in countless kitchens, galleys, bakeries and food preparation areas. To its excellent physical properties may now be added the further advantage of functional color.

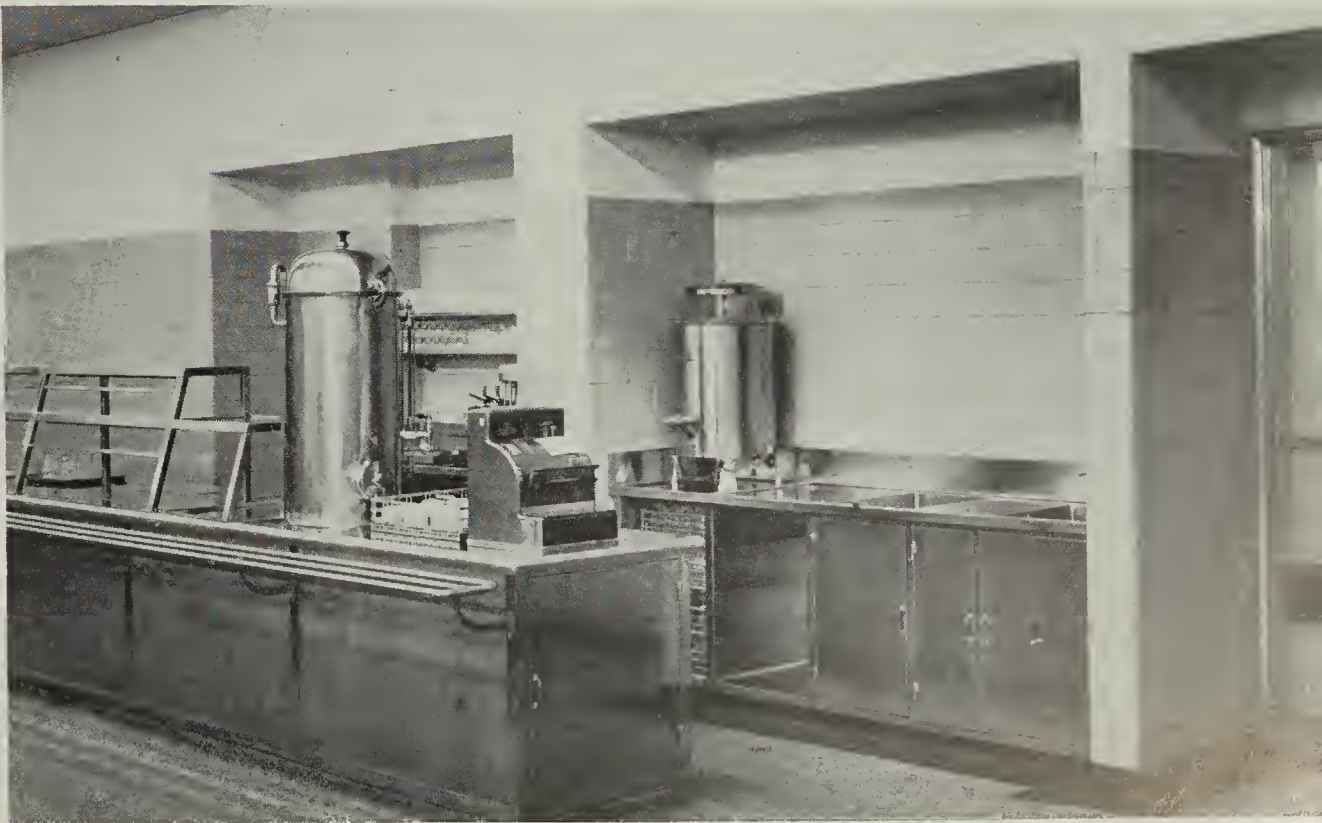
White will perhaps always be favored. It has been commonly specified, and it is the cleanest of all finishes. Yet as the lighting industry has made higher levels of illumination economically practical, white may cause glare. Many kitchen tasks are hazardous and involve sharp cutting devices and intensely hot surfaces. To aid human vision and promote safety, the subdued wall color becomes desirable.

One ideal color for kitchens is Light Green or Green Mottle, although White Mottle and Gray Mottle may be considered. Refrigerated areas may, in contrast, be Ivory, Sunlight Yellow, Coral, Cream Mottle, Clear Glaze or Cream Tone Salt Glaze—such spaces often being without daylight and warm colors being appropriately bright and luminous.

However, for the cafeteria or dining room itself, Coral is highly recommended because of its appetizing look. The area back of the service counters—frequently in an alcove—may be Blue Facing Tile, this cool hue offering a pleasing complement to the tint of most foods.

Other harmonious cafeteria schemes are to be designed with Sunlight Yellow, Light Green, Ocular Green, Green Mottle. Grays in general are not as satisfactory as more cheerful and emotionally stimulating colors.

The clay tile surface makes cleanliness easy—and it tends to resist the accumulation of grease, dust or film.



RESEARCH METHOD IN COLOR SELECTION

The color standards of the Facing Tile Institute, illustrated on the following spread, have been selected through scientific research. While popular appeal—as in consumer goods—has been taken into consideration, other factors have been carefully weighed and determined.

There are no “gaudy” hues for the sound reason that facing tile often is applied in large areas where too much brilliance of hue would be out-of-place. Further, modern technical practice has shown that relatively subdued colors are easiest on the eyes. They relieve glare, establish proper brightness ratios and lack distraction. Many facing tile installations are in areas and departments where human occupancy is long and where functions are best served with conservative rather than dominating colors.

Every effort has been made to understand the problems of the architect, builder and building owner. A wealth of actual experience and case history has been called upon to develop a line of useful and versatile standards—to last through the years and to have permanent rather than passing beauty.

Rigorous laboratory control goes into the formulation of structural clay facing tile bath as to quality and color.



The colors shown on the following two pages represent industry-wide standards. Slight variation is to be expected because of the nature of vitreous firing and the inadequacy of printing reproduction.

white	A hard, durable surface and the brightest of all finishes for a multitude of applications where glare may not be objectionable.
light gray	A very practical and beautiful color where good visibility is to be assured. Gray is free of glaring brightness and will fail to distract attention in critical seeing tasks.
ivory	A warm, off-white tint, suitable for areas in which abundant light reflection is wanted.
sunlight yellow	Yellow occupies the point of highest visibility in the spectrum. Its reflections make seeing acute and its appearance is sunny and luminous.
coral	A subtly warm "flesh" tone to color condition an interior against low temperatures. Coral holds special appeal to women. It has wide uses in employee facilities such as wash rooms.
tan	A trim color for Ivory, Sunlight Yellow, Cream Mottle. Useful by itself where warm low brightness is preferred.
light green	A color of universal utility for almost any operation involving many employees.
ocular green	A functional color for critical seeing tasks and where cool low brightness is wanted. Also harmonious for trim.
blue	This color has many special applications. It has architectural beauty and mass appeal.
white mottle	Desirable where a variegated finish of high reflectance seems appropriate.
gray mottle	A widely specified color for any number of uses to relieve glare and remain unobtrusive over large areas.
cream mottle	For an off-white effect having an interesting surface texture.
green mottle	One of the most useful, functional and pleasing of all standards.
clear glaze, cream tone salt glaze, buff tone salt glaze	Three warm gloss finishes, slightly lower in cost than color glazes.
unglazed tile	These products have matt finish. The same principles as above may guide their selection for interiors. Beautiful and practical where a glazed surface is not necessary. From a cost standpoint it is the most economical structural clay facing tile.

FACING TILE COLOR STANDARDS

Percentages indicate light reflection

Type and direction of coring and scoring
is optional with manufacturer

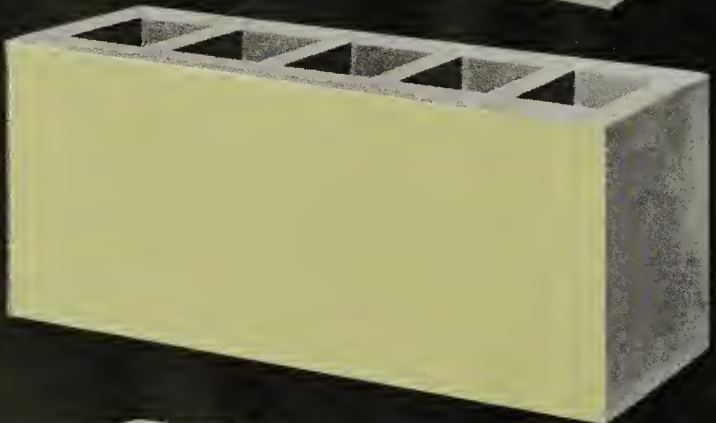
83%
WHITE



49%
LIGHT GRAY



67%
IVORY



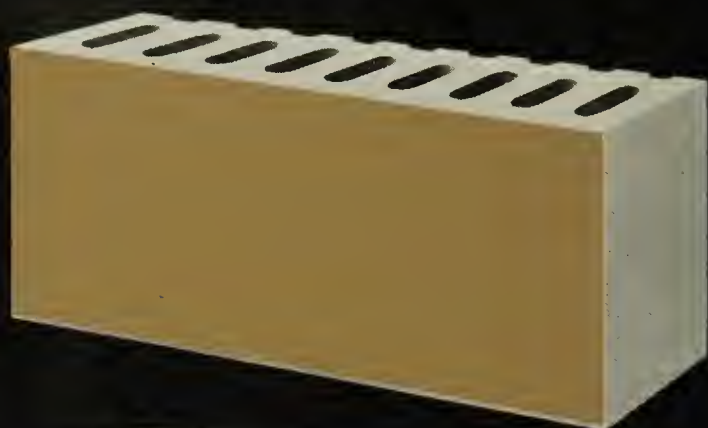
65%
SUNLIGHT
YELLOW



58%
CORAL



36%
TAN



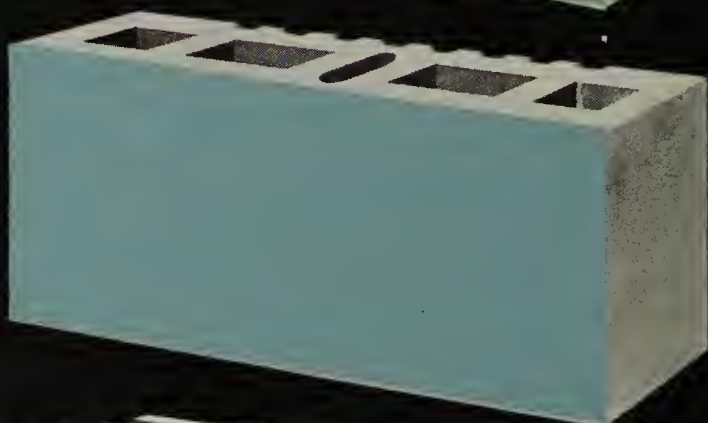
46%
LIGHT GREEN



37%
OCULAR GREEN



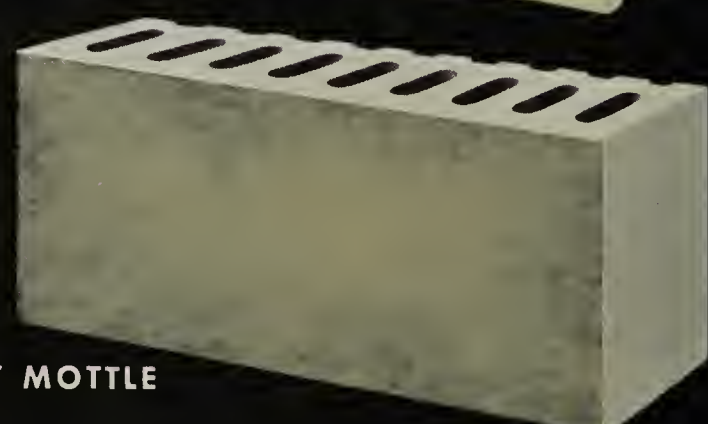
35%
BLUE



64%
WHITE MOTTLE



41%
GRAY MOTTLE



▶ CERAMIC COLOR GLAZE - SATIN FINISH ◀

▶ MULTICOLOR SHADES ◀ ▶ CERAMIC COLOR GLAZE - SATIN ◀

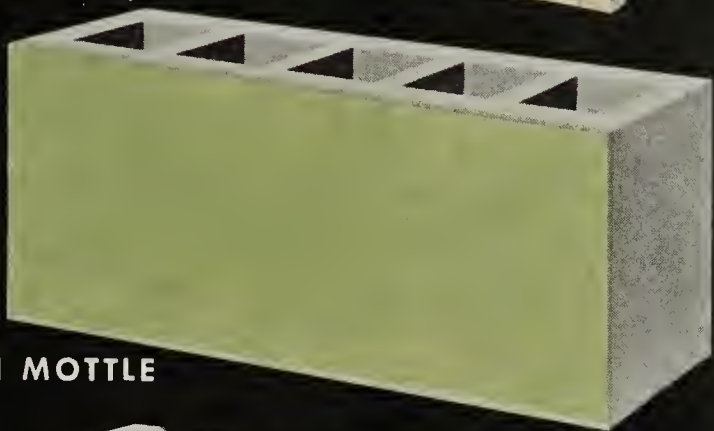
▶ GLAZE - GLOSS ▶ TRIM ▶ MULTICOLOR SHADES ▶

▶ SALT GLAZE - GLOSS ◀ ▶ CLEAR GLAZE ◀ ▶ TRIM ◀ ▶ MULTICOLOR SHADES ◀

49%
CREAM MOTTLE



49%
GREEN MOTTLE



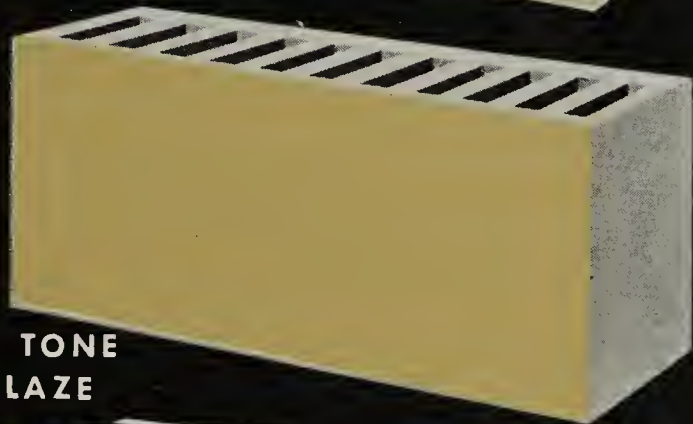
5%
BLACK



51%
CLEAR GLAZE



44%
CREAM TONE
SALT GLAZE



27%
BUFF TONE
SALT GLAZE



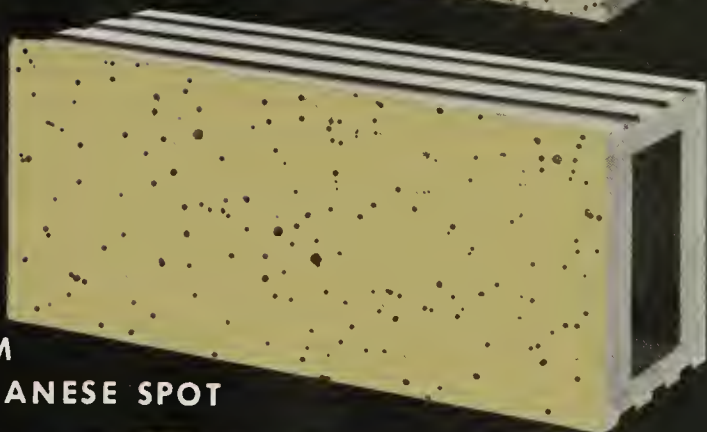
40%
LIGHT GRAY
NATURAL CLAY



40%
GRAY
MANGANESE SPOT



52%
CREAM
MANGANESE SPOT



43%
LIGHT BUFF
NATURAL CLAY



50%
CREAM
NATURAL CLAY

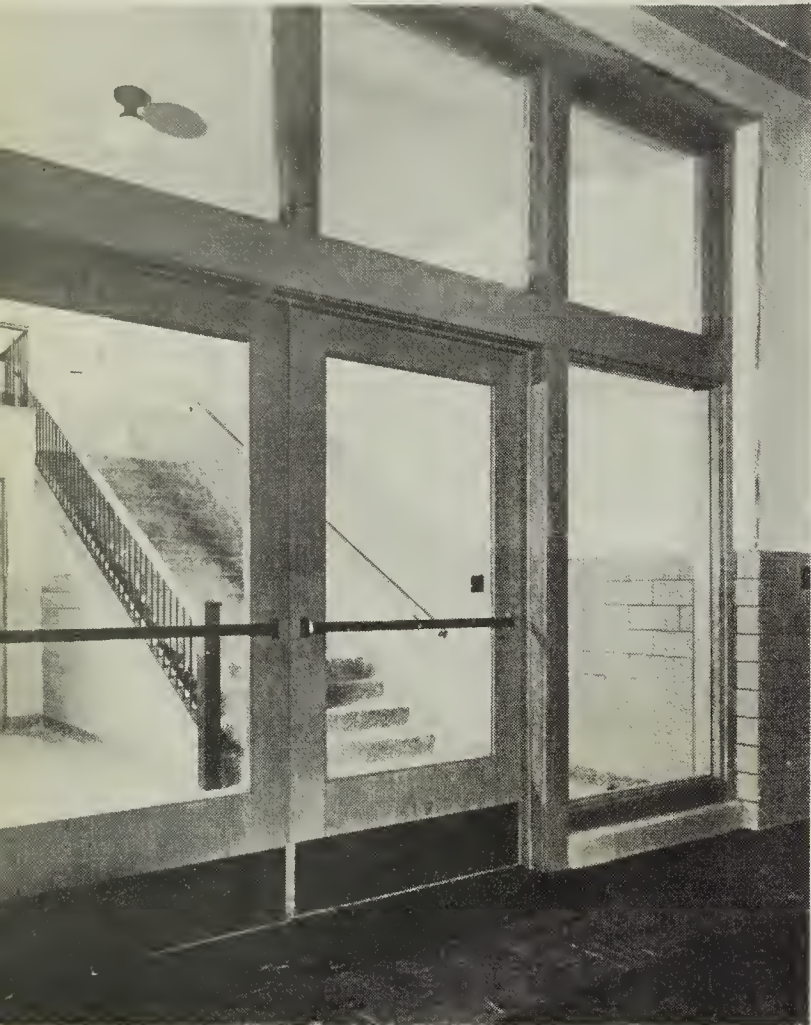


35%
GOLDEN BUFF
NATURAL CLAY



▶ UNGLAZED NATURAL CLAY - MATT FINISH ◀

SCHOOLS



Deeper shades of facing tile have a rare architectural beauty for school entrances and foyers.

Color is vital in schools as a safeguard to child welfare. Fortunately, great progress has been made in recent years. The eminent work of D. B. Harmon of Texas, for example, has shown that conditions of glare adversely affect health, posture, eyesight, learning.

The carefully balanced reflectances of most facing tile color standards agree with modern scientific practice. For all its advantages of cleanliness and permanence, the product also will be found endowed with visual qualities that will help further the cause of proper child health and education.

The school as a physical plant needs structural clay tile and may put it to widespread use in practically all departments. However, to have color follow function—and to avoid using it for the mere sake of decoration—intelligent planning should be done. The following specifications have the benefit of practical experience and case history and may be used as a guide in school planning.

In corridors and stairwells, usually having low illumination levels, consideration may be given to Ivory, Sunlight Yellow, Coral, Cream Mottle, Clear Glaze, Salt Glaze—all of which have high reflectance—and to natural clay unglazed tile. Light Gray has been used in some large metropolitan



The hard clean surface of tile well serves the need of permanence and easy maintenance, so important where there is heavy occupancy and traffic. Facing tile can be made virtually glare-free where the natural or artificial lighting system is diffuse. Classrooms in coral, green, gray will create a proper visual balance, lessen contrasts and provide an environment that will help to relieve tension and fatigue.



Coral is the ideal color for wash rooms, locker rooms, dressing rooms to reflect a pinkish light.

For classrooms the more subdued colors in facing tile are advisable to aid mental concentration.



In corridors and stairways, usually without good natural light, bright colors such as Ivory, Sunlight Yellow, Coral, Clear Glaze are appropriate.

school systems and will offer striking emphasis to more colorful tones in classrooms and shops.

For classrooms and study rooms of all types, Coral, Light Green, Light Gray, Green Mottle, Gray Mottle have precisely right reflectances to rest the eyes and aid visual and mental concentration.

In laboratories, lighter colors may be preferred, Ivory, Coral, Light Green, Light Gray, Gray Mottle, Green Mottle, Unglazed Light Gray. Yet in shops and manual training rooms the best choice would be Sunlight Yellow, Ivory, Cream Mottle, Clear Glaze or Salt Glaze. These more luminous tints have a stimulating effect and are best suited to physical tasks.

In drafting rooms, home economic departments, cooking rooms, art rooms, sewing rooms, the same colorful Coral, Sunlight Yellow, Light Green, Green Mottle will have the richest beauty.

In sight-saving classes, occupied by pupils having visual deficiencies, Sunlight Yellow or Ivory are suggested.

For locker rooms, shower rooms, swimming pools, Coral is ideal and will reflect a healthful glow throughout the area. Wash rooms may be Coral, Light Green or Green Mottle.

In auditoriums and gymnasiums, light colored tile, as suggested, for corridors may be selected. Here, however, it may be practical to consider unglazed natural clay tile which has a matt finish and may be suitable because of less abuse and less need of maintenance. Wainscot may be glazed tile.

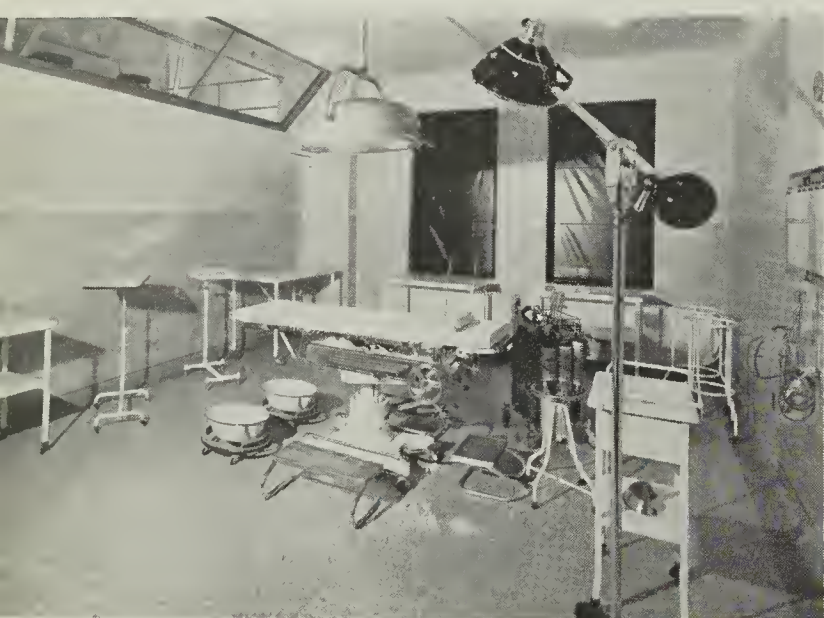
Kitchens may be designed to follow the recommendations described under Food Service on page 11—also cafeterias.

As an architectural feature in entrance lobbies, foyers, special reception areas and the like, the deeper Ocular Green, Blue or Tan may be used for emphasis and relief. These locations may also be ideal for unglazed natural clay tile.

Schoolroom lighting should be diffuse in order to prevent glare. Semi-indirect lighting systems are generally endorsed. Natural daylight may be controlled with glass block, high-transmission window shades, special light diffusers. The satin finish of facing tile, which has a slight angular sheen, will thereby be correctly illuminated—and the use of the product may be widely extended for all the merit it has over less durable materials.



HOSPITALS



Wall tones in operating rooms should not be bright. To avoid glare, prevent undue constriction of the pupil of the eye, subdued colors are required—notably facing tile Ocular Green. Where the environment is moderately low in brightness, the surgeon will find it easier to hold his attention on the field of operation. The acuity of his eyes will remain sharp and clear, and he will experience less fatigue.

Because of the nature of hospital service color should be used functionally. The need to aid the visual acuity of the surgeon, to promote speedy convalescence among patients, to ease fatigue among nurses and hospital personnel is quite evident. While any direct therapy for color is to be questioned, there is no doubt but that proper control of brightness and color can do much to improve hospital care. Of all institutions, perhaps, the hospital is one in which scientific color practice should be at its best.

Indeed, the whole conception of engineered-color had its beginning over two decades ago in the design of operating rooms. At that time high levels of artificial illumination made traditional white walls objectionable because of glare. Subdued tones of green—corresponding directly to facing tile Ocular Green—were developed (a) to lessen glare, (b) reduce contrasts in the field of vision, and (c) complement the reddish tint of human tissue.

Today Ocular Green is an accepted standard for operating rooms. Some institutions, however, hold preference for Light Green, Green Mottle, Light Gray and Gray Mottle. Any of these colors will suffice. The only tones to be avoided are those with high reflectances above 60 per cent.

Thus for the surgical division. Ocular Green may be used in the operating room, with Light Green or Green Mottle in adjacent areas.

Sterilizing rooms, little occupied by personnel, may be White, Ivory, Sunlight Yellow, White Mottle, Cream Mottle to promote hygienic cleanliness.

For utility rooms, diet kitchens, linen rooms, again the brighter tone will have a cheerful psychological effect. Good standards will be found in Ivory, Sunlight Yellow, Coral, Light Green, White Mottle, Cream Mottle, Green Mottle, Clear Glaze. Gray may be considered, although it seems better adapted to other departments.

For physiotherapy, X-ray therapy, and treatment rooms, Light Green and Green Mottle are cool and relaxing. Adjoining dressing rooms may be Coral to reflect a flattering pinkish glow.

In wards and patients' accommodations, the two best standards are Light Green (or Mottle Green) and Coral. The former may be best for chronic patients, the latter for patients on the road to recovery. Green will help to reconcile the patient to a prolonged stay, while Coral will be moderately stimulating.

Laboratories may be any one of several colors, although Light Gray and Gray Mottle are suggested to lessen glare and to provide a non-distracting environment suitable for difficult seeing tasks and visual concentration.

Light Green, Green Mottle, Sunlight Yellow, Cream Mottle, Clear Glaze or Salt Glaze are proposed for laundries—the cool tones where temperatures



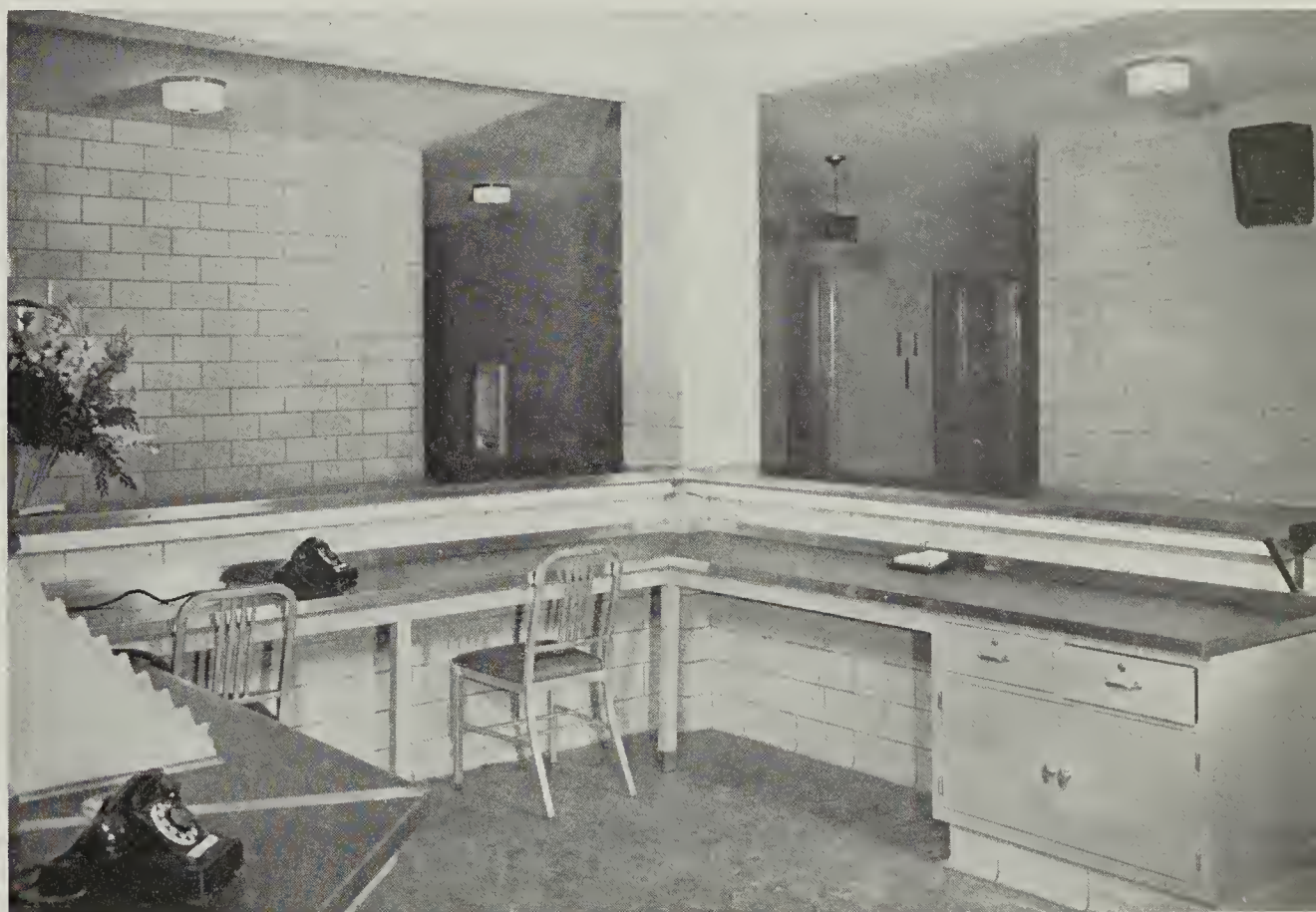
Laboratories in subdued tones of gray or green will reduce wall glare and make seeing easier.

are high, the warm tones where the department may be below ground and without daylight. Kitchens and food service may take specifications previously described on page 11.

In the dispensary: consideration may be given to Blue or Sunlight Yellow for the reception area, Light Green or Green Mottle for treatment rooms, Coral for dressing rooms.

In corridors and stairwells, the paler tints are suitable, Ivory, Sunlight Yellow, Cream Mottle, Clear Glaze, Salt Glaze or natural clay tile.

For reception areas and lobbies, Blue will hold universal appeal. Here, however, variety should be planned to excite interest and thereby lessen nervous tension. Coral or Sunlight Yellow may be used in alcoves and back of reception desks. Natural clay tile may likewise be considered.



While facing tile is obviously right for hospitals, the introduction of pleasing colors adds a psychologically cheerful plus value.



Cool colors for chronic patients, warm colors for convalescents—these are good principles to follow.

COMMERCIAL



A choice of light, medium and deep facing tile colors makes possible an endless array of color harmonies for decorative features in lobbies and corridors.

In commercial buildings, stores, transportation centers, restaurants, service buildings and the like, appearance factors may be more important than functional color as such. Here the need is to cater to the likes of the public and to design color arrangements that will attract customers and hold all possible competitive advantage.

As a building material, structural clay facing tile assures permanence and quality. It has an impressive dignity. It is profitable because of its lasting qualities. It is economically maintained over the years without the need for costly refinishing.

Beyond this, the colors standardized by the Facing Tile Institute have a soft, pleasing beauty over large area. For this reason they are well liked by architects who know the importance of having the elements of color and form harmoniously related. Garish hues conflict with good design. If bright color is to be introduced, its right place is in furnishings, fixtures, decorative elements and displays.

The full palette of the Facing Tile Institute will enable the architect to give original expression to his talent and training. The colors lend themselves to concordant arrangements, and with them the skilled eye may show real ingenuity.



Here unglazed facing tile has been used to advantage in a bakery for a rich textured effect.

Right colors hold unquestioned appeal to the public and are an important factor in assuring a profitable business.



HOTELS



Facing tile has a style of its own in the public spaces of hotels, to be capitalized by good design.

The use of facing tile in hotels has been constantly extended over the years. Full occupancy, heavy traffic, severe use and abuse necessitate a material which will first of all not deteriorate and look "dowdy" and secondly will not demand frequent and costly maintenance.

In kitchens and food service, in laundries, standards previously described will solve many problems in these important service departments.

Stairwells in Sunlight Yellow, Ivory, Coral, Light Green, Cream Mottle, Green Mottle, Clear Glaze, Salt Glaze, natural clay tile, will appear permanently clean and bright.

In coffee shops, Coral is an excellent choice. Color combinations may be devised to combine it with Blue. Other schemes might comprise Sunlight Yellow with Black or Light Gray, Ivory with Tan, Light Green or Green Mottle with Ocular Green.

Barber shops may take Blue, Ocular Green, Light Green or Green Mottle. Turkish baths may take Light Green or Green Mottle in exercise and treatment rooms. Coral in dressing rooms.

Depending on style of architecture, facing tile may be carried into corridors, lobbies, reception areas. Here good design and form may be enhanced with an appealing variety of color—offset by soft materials in draperies, rugs and carpets, upholstery fabrics, fountains, pools and natural plants.

For coffee shops and lunch rooms, facing tile may be kept spotlessly neat. Easy to clean, resistant to oils, smoke, dirt and abuse, the finical attitude taken by the public toward food and food service may be well met. Facing tile does not stain, spot, soil or otherwise become unappetizingly shoddy. A colorful, sanitary interior will be profitable and will likely attract and hold more trade.



For years, facing tile has proved its merit as the one right material for hotel food service.

PUBLIC BUILDINGS



The bright tint seems best for stairwells, corridors, below-ground areas deprived of natural light.

Combinations of Blue with Coral or Light Green with Coral are particularly good for swimming pools. Coral on walls will appear warm and comfortable. The pool in white or green will give the water a clear and fresh aspect. Other schemes may be designed. For example, Sunlight Yellow on walls may be combined with white for the pool and blue for trim.

Large architectural projects, public buildings, office buildings, have benefited from the advantages of facing tile either in glazed or natural clay finish. Where a generation or more of service is to be expected, initial costs may be offset by lack of need for costly maintenance and refinishing.

Wash rooms, locker rooms, stairwells, corridors, food service departments, mechanical shops, laboratories, boiler rooms, engine rooms, recreational areas, swimming pools, medical departments, lobbies, may all be specified in structural clay facing tile for years of durable and attractive appearance.

As to the organization of color plans, functions should be considered in utility areas, while human preferences should guide the choice for public spaces.

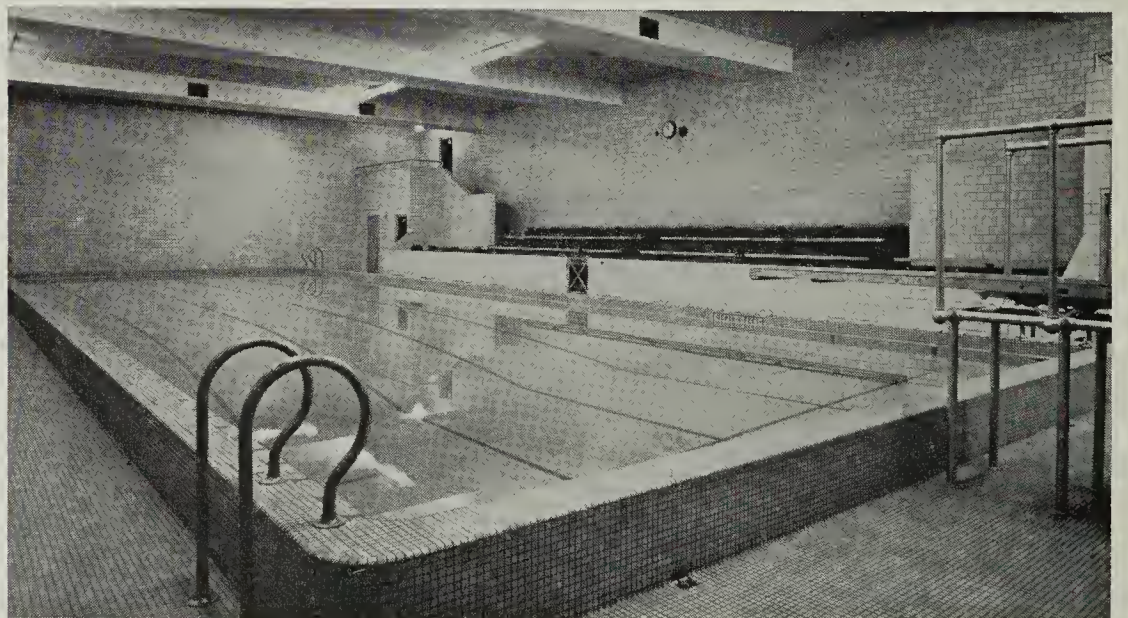
As principles, Ivory, Sunlight Yellow, White Mottle, Cream Mottle, Clear Glaze, Salt Glaze, are appropriate for areas normally deprived of strong light.

Wash rooms may be in Coral for women, Light Green for men.

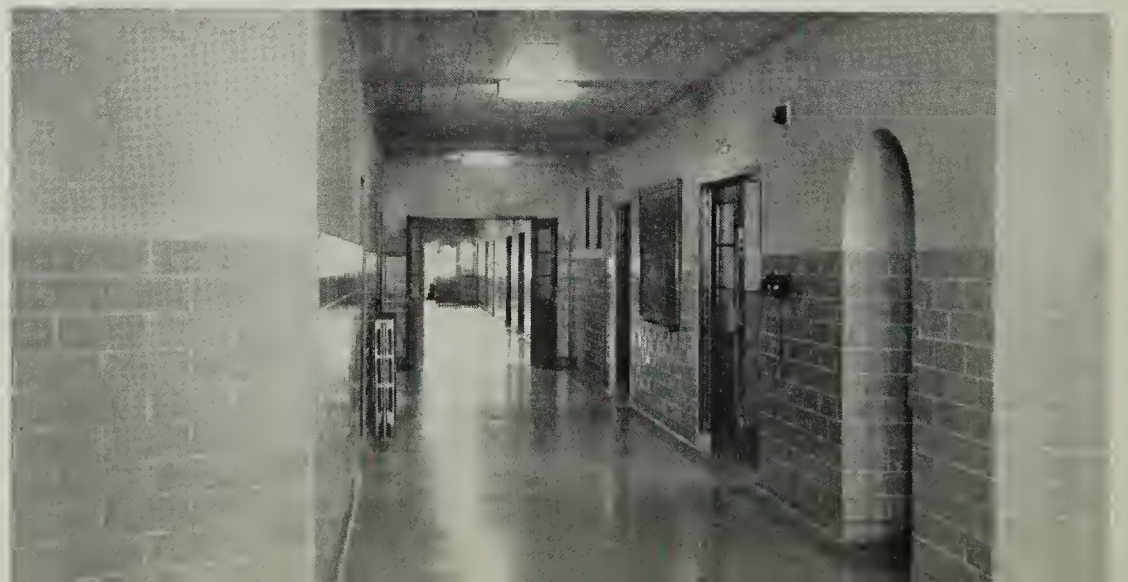
Light Green, Green Mottle, Light Gray, Gray Mottle, may be best where concentration of personnel is fairly heavy and where these subdued tones will relieve glare and eyestrain.

Ocular Green and Tan may be chosen where exceedingly critical seeing tasks are performed.

Where the color is to have strong emotional appeal, the colors that will have greatest attraction are Sunlight Yellow, Coral, Light Green, Blue, Green Mottle—or harmonious combinations of them.



Facing tile walls or ceilings in corridors will stand years of service and be easily cleaned to their original and permanent appearance.



HOUSING

In recent years facing tile has found increased acceptance in housing projects. Offsetting initial cost are the advantages of structural permanence, minimum expense for maintenance, freedom from deterioration, vermin, decay.

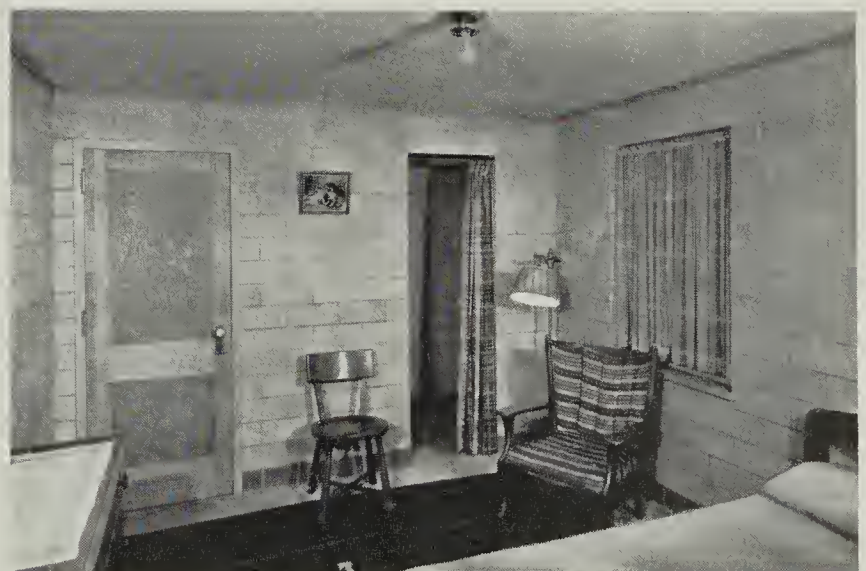
In low cost housing, industrial housing, government housing the economic factor is significant, for the product is structural and virtually everlasting. For motels, markets, filling stations, small service buildings, housekeeping is facilitated and non-fading colors hold their appeal indefinitely.

It is to be admitted, however, that good architectural talent is needed to blend the natural beauty of facing tile with outstanding art forms. Modern interior home styles have used natural clay brick effectively and may do equally well with ceramic glaze. Combined with picture windows, inside gardens, terraces, pools, walls and floors that extend from indoors to outdoors, facing tile offers an incentive to artistic and creative originality.

Because the new color standards of the Facing Tile Institute are subdued in tone and unlike the more garish "mass market" hues of the past, they are highly favored by architects. The general trend toward more color in American homes finds a desirable medium in facing tile.

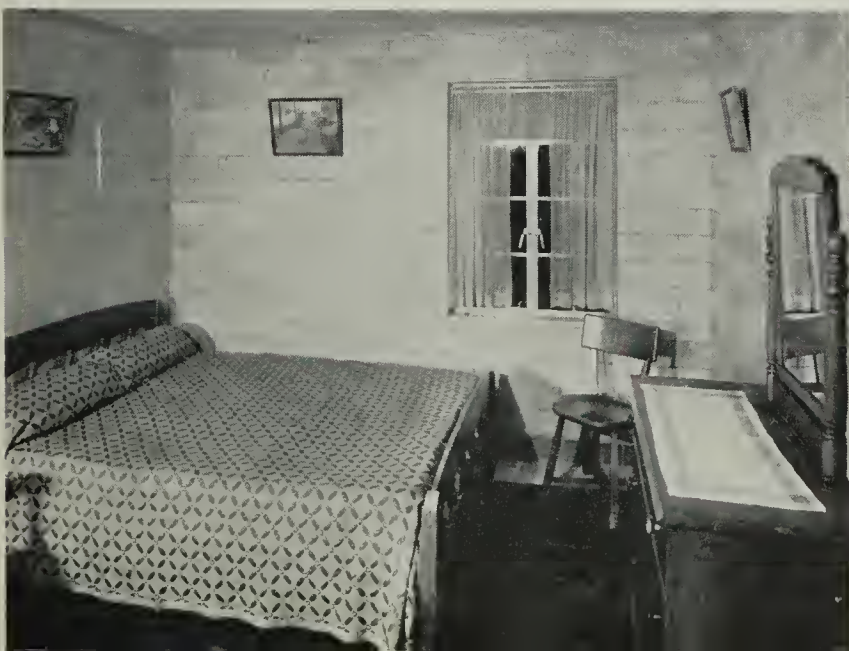


The structural qualities of facing tile lend themselves to simplified home construction and functional design.

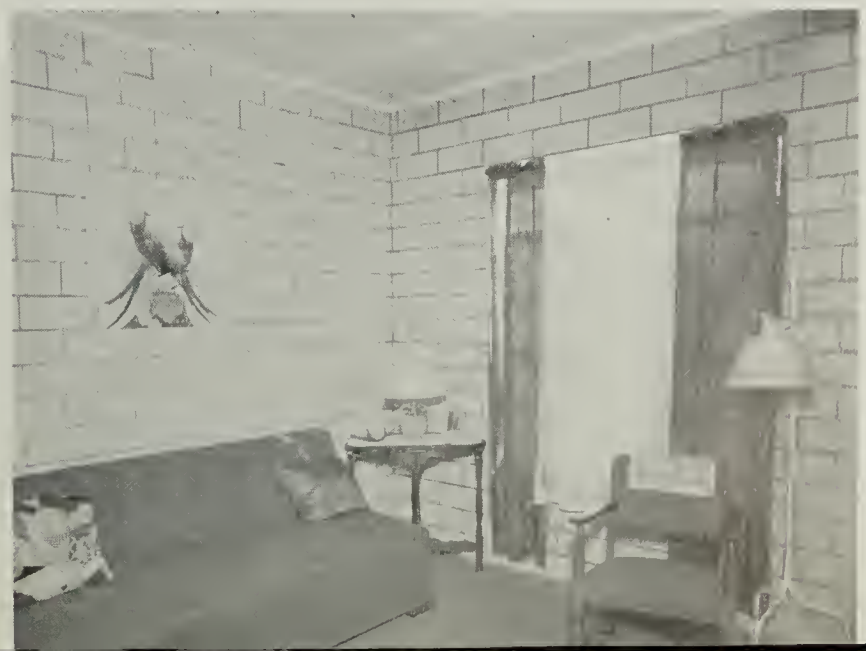


Color has a friendly quality that gives facing tile a mellow and home-like beauty.

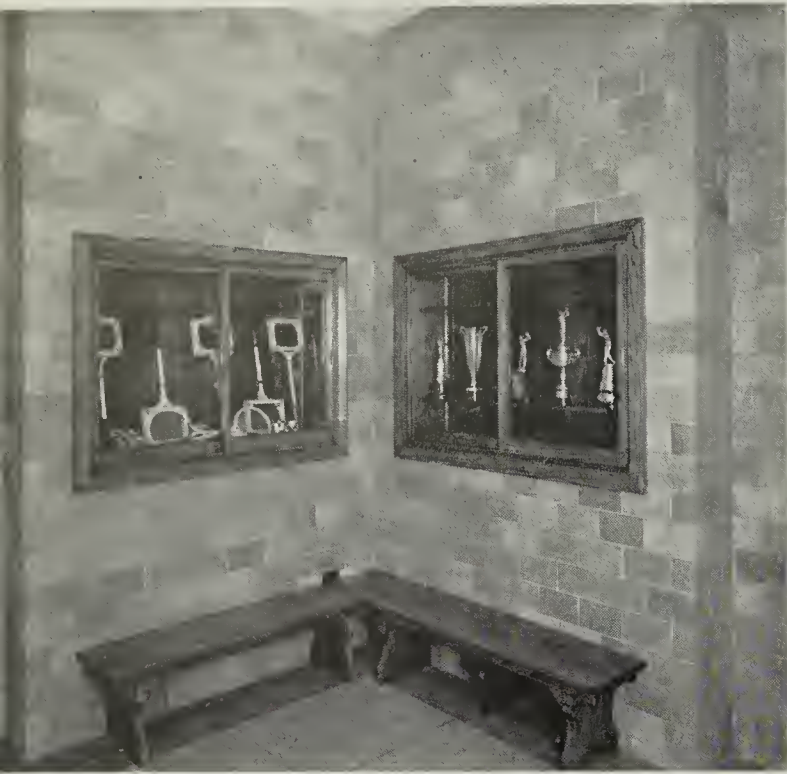
The durable surface of tile may be relieved by the harmonious introduction of fabrics and carpets.



Color and quality combine to make facing tile as livable as it is practical.



NATURAL FINISH UNGLAZED TILE



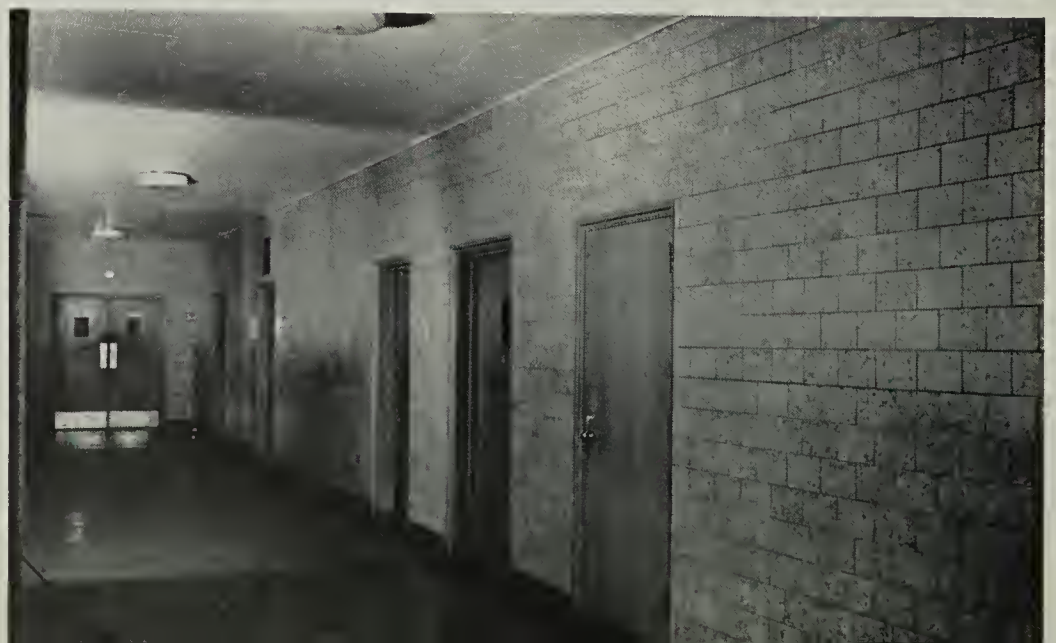
The varied tones of natural clay tile create an effect that is at once soft and harmonious.

Church interiors may be given the warmth and beauty seen in natural formations of clay and rock. This atmosphere seems to complement the spirit of ecclesiastical architecture and to bespeak things ageless and traditional. A tapestry effect, which may be emphasized by combining tile of different sizes, provides a subtle background against which decorative colors and architectural forms and details will blend harmoniously.

Six color standards are available in unglazed natural clay tile having an almost totally diffuse or matt finish: Light Gray, Cream, Light Buff, Golden Buff, Gray Manganese Spot, Cream Manganese Spot. These products, in standard facing tile sizes, have a multitude of uses where a glazed surface is not necessary.

In commercial, institutional and industrial buildings, the natural clay product appears soft and restful to the eye. The colors, all natural, have a beauty that is liked and appreciated by many architects. Because of inherent variation, the tile has a rich tapestry effect which tends to give large areas a mellow interest and charm not generally found in other building materials. This beauty is quite fitting these days because of a definite trend toward natural clay products in many architectural projects.

Two major color qualities are to be noted—warm cream and buff tones; neutral grays. Depending on whether a luminous or cool atmosphere is wanted, any one of the six standards may be chosen. The manganese spot tile, however, seems best adapted to wall areas seen at a distance.



Natural clay tile has true permanence and beauty that will last the life of a building.

FACING TILE BUILDING EXTERIORS



The tile exterior may have simple and bold design. Its larger sizes lend themselves to good mass design.

Large-scale projects are readily served because of the speedy and efficient production of facing tile.

Tile of different sizes and colors may be combined for purposes of good architectural balance or merchandising emphasis. One great advantage of facing tile is permanence of color and relative ease of cleaning and maintenance. Some business chains adhere to standard color effects and construction plans which may be located in any region of the country with assurance of uniformity and durability both as to color and unit dimensions.

Unglazed natural clay tile is frequently used for the exterior of buildings. Variation in size, texture, color all are possible. Large areas may be given pattern and design.

The permanence and excellent weathering qualities of this material are well recognized in the architectural and building fields. So also has there been high regard for beauty and richness of appearance. Varied color choice allows for originality and uniqueness in design—for any region or climate.

The unglazed natural clay product has come into increased use over the past several years. Large sizes speed up the construction process and save time in labor. The ability to use the tile in conventional and unconventional patterns offers a certain artistic flexibility that well suits the plainer and more functional forms (free of embellishment and ornament) found in modern architectural design.

High brightness is possible with Light Gray and Cream. A luminous, sunny result—attractive in warm climates—will follow the specifications of Light Buff, Golden Buff, Cream Manganese Spot. In colder climates Gray Manganese Spot is popular and looks particularly well. As with all structural clay facing tile products, permanence and natural beauty are assured.



ILLUMINATION IS VITAL TO CONTROL GLARE

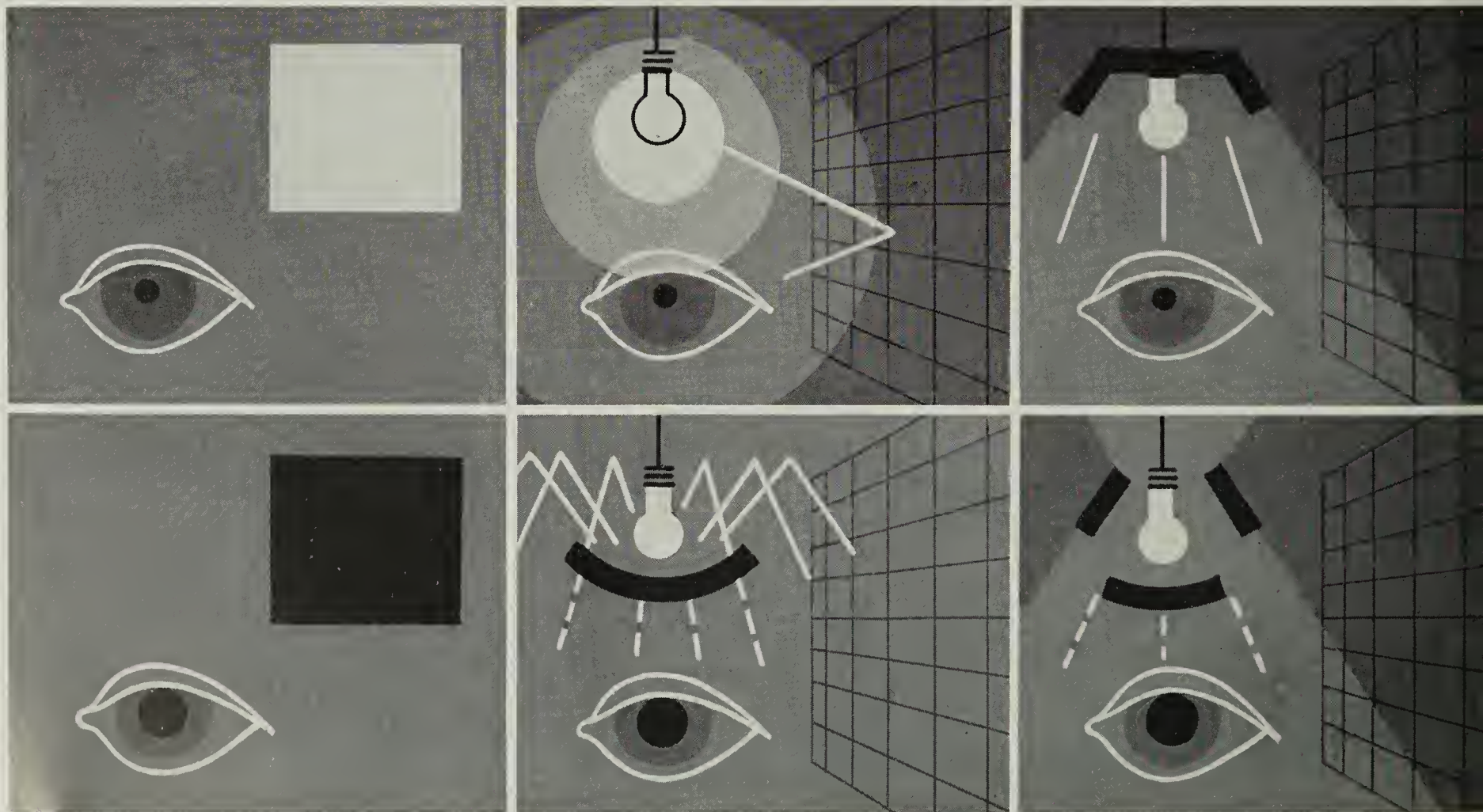
The standard and endorsed finish of the Institute is satin, a hard, durable surface with a slight angular sheen.

It is important, of course, to control and avoid glare. Disturbing specular reflections are by no means due entirely to the surfaces and areas in an interior but also to poorly designed lighting systems. Where there is a good distribution of diffuse light, even mirrors and highly polished metals and ceramics will be remarkably free of gloss and glitter.

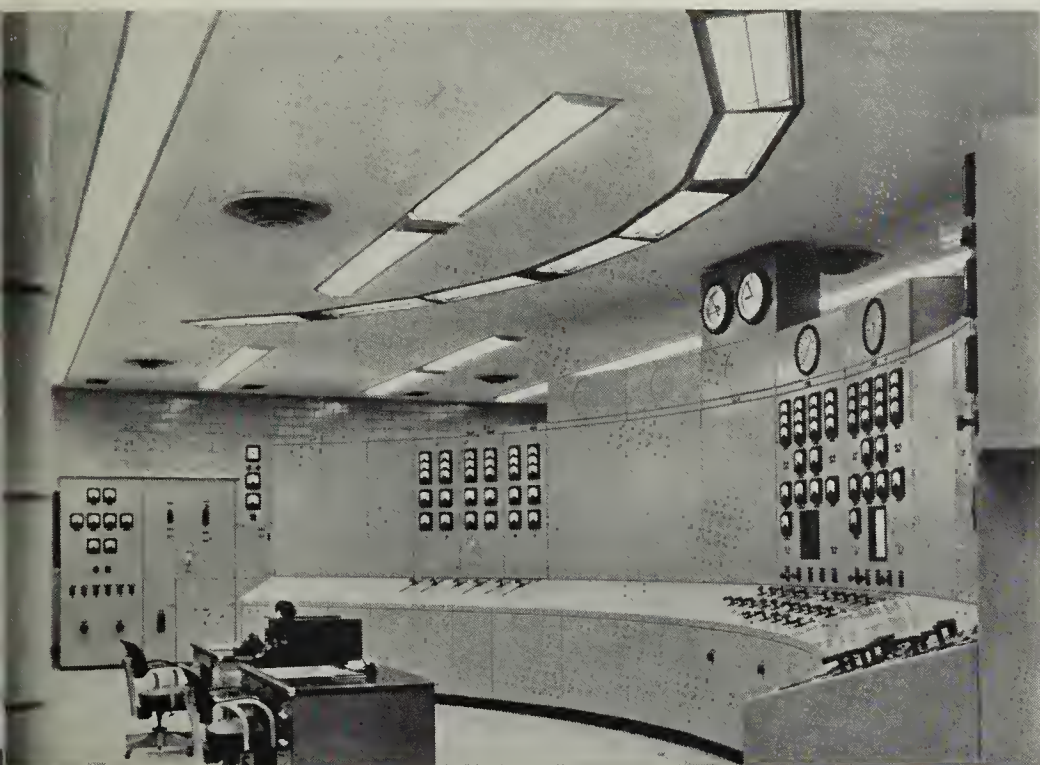
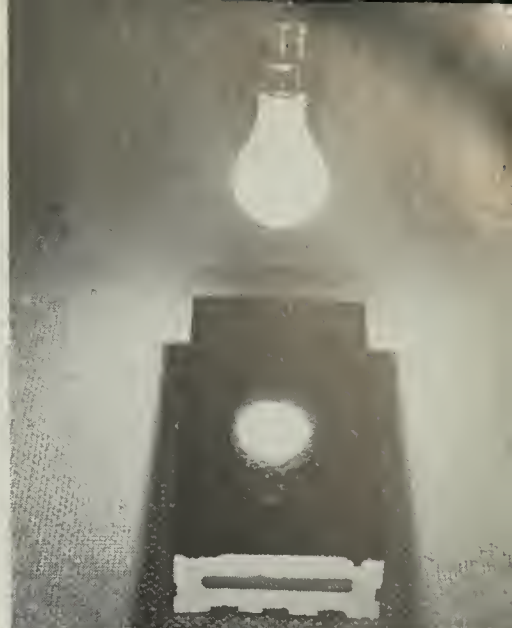
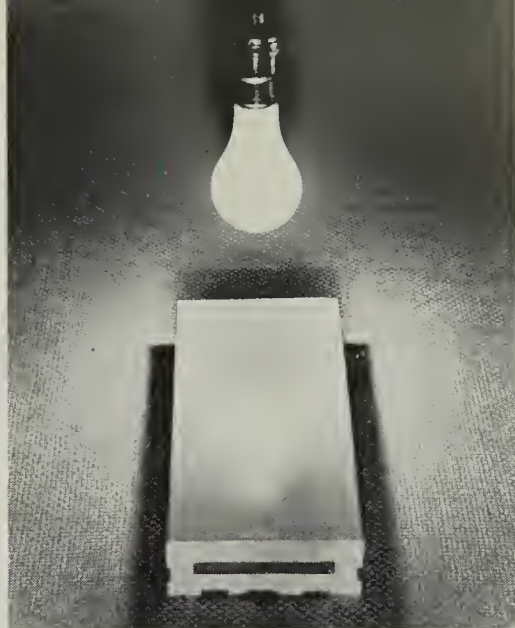
Study the illustrations on these two pages. Glare is bad because it tends to constrict the pupil opening of the eye, to lower visibility, fog vision and overstimulate the retina. If light sources, bulbs and tubes, are improperly exposed, they may shine directly into the eye or be reflected directly from walls: The same light sources well shielded to scatter and diffuse the light will assure softer and therefore relatively glare-free illumination.

Directional light that is thrown sharply downward and that leaves the ceiling and overhead dark may be efficient in the delivery of light on a working plane, but such illumination may waste human efficiency through excessive and objectionable contrast. It is far better to have less light if such light is more or less uniformly bright throughout the field of view. To think wholly in terms of light meter readings or of foot-candles is to invite error and trouble.

The standard satin finish of facing tile will be restful and easy on the eyes where the lighting system itself is well designed to cast a soft, uniform and shadowless illumination.



Specular reflections on dark facing tile are more noticeable than on light colored tile for the simple reason that contrast between the image of the light source and the brightness of tile surface is less. Where light is well distributed and diffuse, dull mat surfaces are not easily distinguished from semi-glass finishes. In the photographs to the right the left tile is white mat, the center tile white satin and the right tile black high gloss.



These photographs show well designed lighting systems. Note absence of glare and specular reflections on the facing tile walls. Freedom from glare is as much a function of lighting as it is of surface finish. Courtesy, General Electric Co.

THE IDEAL SURFACE FINISH

Why is satin finish an Institute standard? First of all, such a surface will stay clean, be less likely to collect lint or smudge—and it will be easier and more economical to maintain. Secondly, dull mat finishes may be readily marked with pencils, dirty fingers, etc.; to use satin is to anticipate and avoid smearing. Third, gloss finishes are not only glaring but they may also soil readily! High gloss will show finger marks, smudge, condensation, soot, smoke—just as dark ceramic floors and wool carpets, black linoleum and tile, will be less practical than medium tones. However, where gloss finishes are wanted, clear glaze and salt glaze tile are available. Where completely mat finishes may be desired, unglazed natural clay facing tile may be specified.

FACING TILE...

THE FINER BUILDING MATERIAL

The products of the members of the Facing Tile Institute are all produced from light burning de-aired clay. Years of experience have proved that this type of clay provides the best body for finest quality glazed or unglazed facing tile. The designer can select from a variety of colors and finishes in ceramic glaze, salt glaze, clear glaze or unglazed. Any design condition can be met with the varied shapes and sizes, together with all of the necessary supplementary shapes.

The facing tile produced by the members of the Facing Tile Institute is truly the "finer building material." Each member's products are tested annually to be sure that they meet the quality standards set forth in the Institute's specifications. Further improvement in quality and shapes is constantly being sought through the Institute's continuous program of research.



Ceramic glaze facing tile "soaps" being applied as a wainscot on a structural tile wall.

load bearing

The facing tile units whose nominal thicknesses are 4 in. or greater are load-bearing units and may be used in constructing composite load-bearing walls. The nominal 2 in. thick units, called "soaps" are used only as a veneering unit and are not considered load-bearing.

permanent

The colors and finishes of structural glazed and unglazed facing tile are permanent, since they are the product of intense heat and are completely inert. The high quality of the clay body itself plus scientific methods of manufacture assure the permanency of these products in all normal usages.

fire-resistant

The fire-resistance ratings of structural clay facing tile have been established by standard fire tests conducted at both the National Bureau of Standards and at Ohio State University. The results of these tests are summarized in the catalog of the Facing Tile Institute and are also reported in National Bureau of Standards Report BMS92, published in October, 1942.

chemical-resistant

Because of their resistance to the actions of chemicals, ceramic glazed facing tile are ideal for use in laboratories, chemical plants and other types of structures where such resistance of the wall facing material is important. The Institute specifications for ceramic glazed tile include a chemical resistance test of the finish.

hygienic

The highly impervious and non-absorbent finish which is an integral part of the finished surfaces of facing tile make it an ideal material for use where cleanliness is of great importance, such as in hospitals, medical clinics, etc. This finish is permanent and is easily kept clean and hygienic by ordinary washing.

MISCELLANEOUS TECHNICAL DATA

The products of the members of the Facing Tile Institute are all produced to conform to the modular standards of the American Standards Association. This fact, plus their close adherence to standard dimensions, makes them an economical material to install, requiring only a minimum of cutting on the job.

The Institute has adopted four face sizes as standard. These are the "4S" Series ($2\frac{2}{3}$ " x 8" nominal face); the "4D" series ($5\frac{1}{3}$ " x 8" nominal face); the "6T" Series ($5\frac{1}{3}$ " x 12" nominal face); and the "8W" Series (8" x 16" nominal face). The nominal 2 in. and 4 in. thicknesses are common to all four series, while 6 in. and 8 in. thicknesses are also available in the 4D and 6T series only. The thicker units in these two series of glazed ware are used primarily for bonding purposes while the soaps or furring units are used principally for veneering. Each series, in addition to the standard stretcher units, includes a complete line of shapes and fittings such as square, bullnose and cover corners, bullnose caps and cove base shapes, as required for various thicknesses and job conditions.

Facing tile shapes are produced with either horizontal or vertical cores at the option of the manufacturer. In general, the cellular designs in the horizontal type are quite similar; but the size, type and spacing of cores in the vertical cored units may vary considerably from one manufacturer's product to another. Stretcher units are furnished with either scored or smooth backs in the nominal 4-, 6-, and 8-in. thicknesses and also selected two-faced units in the 4 in. thickness only. Soap units (nominal 2 in. thickness) are usually furnished with scored backs only. Ceramic glaze and salt glaze units are designed for use with $\frac{1}{4}$ in. mortar joints while unglazed facing tile are designed for use with $\frac{1}{4}$ in. and $\frac{3}{8}$ in. joints.



PURPOSE OF THE FACING TILE INSTITUTE

The Facing Tile Institute was formed and is maintained by responsible and progressive manufacturers of structural glazed and unglazed facing tile. Its aim is constant improvement in the material produced, and to make always available to the architectural profession and the building industry, a product representing the last word in quality and beauty.

It presents the highest standards of quality, and strives to coordinate the physical dimensions of all units. Thus the architect is definitely assured of quality and ease in use, since he is able to design and specify from a single set of specifications with full knowledge that regardless of material used, when furnished by a member of the Facing Tile Institute, the shapes and sizes furnished will be satisfactory, and the quality will meet the high standards of the Institute.

I N S T I T U T E M E M B E R S

BELDEN BRICK CO.
Canton, Ohio

CHARLESTON CLAY PRODUCTS CO.
Charleston 22, West Virginia

THE CLAYCRAFT CO.
Columbus 16, Ohio

HANLEY CO.
New York 17, N. Y.

HOCKING VALLEY BRICK CO.
Columbus 15, Ohio

HYDRAULIC PRESS BRICK CO.
Indianapolis 4, Indiana

MAPLETON CLAY PRODUCTS CO.
Canton 1, Ohio

McNEES-KITTANNING CO.
Kittanning, Pennsylvania

METROPOLITAN BRICK, INC.
Canton 1, Ohio

NATIONAL FIREPROOFING CORP.
Pittsburgh 22, Pennsylvania

STARK CERAMICS, INC.
Canton 1, Ohio

WEST VIRGINIA BRICK CO.
Charleston 24, West Virginia